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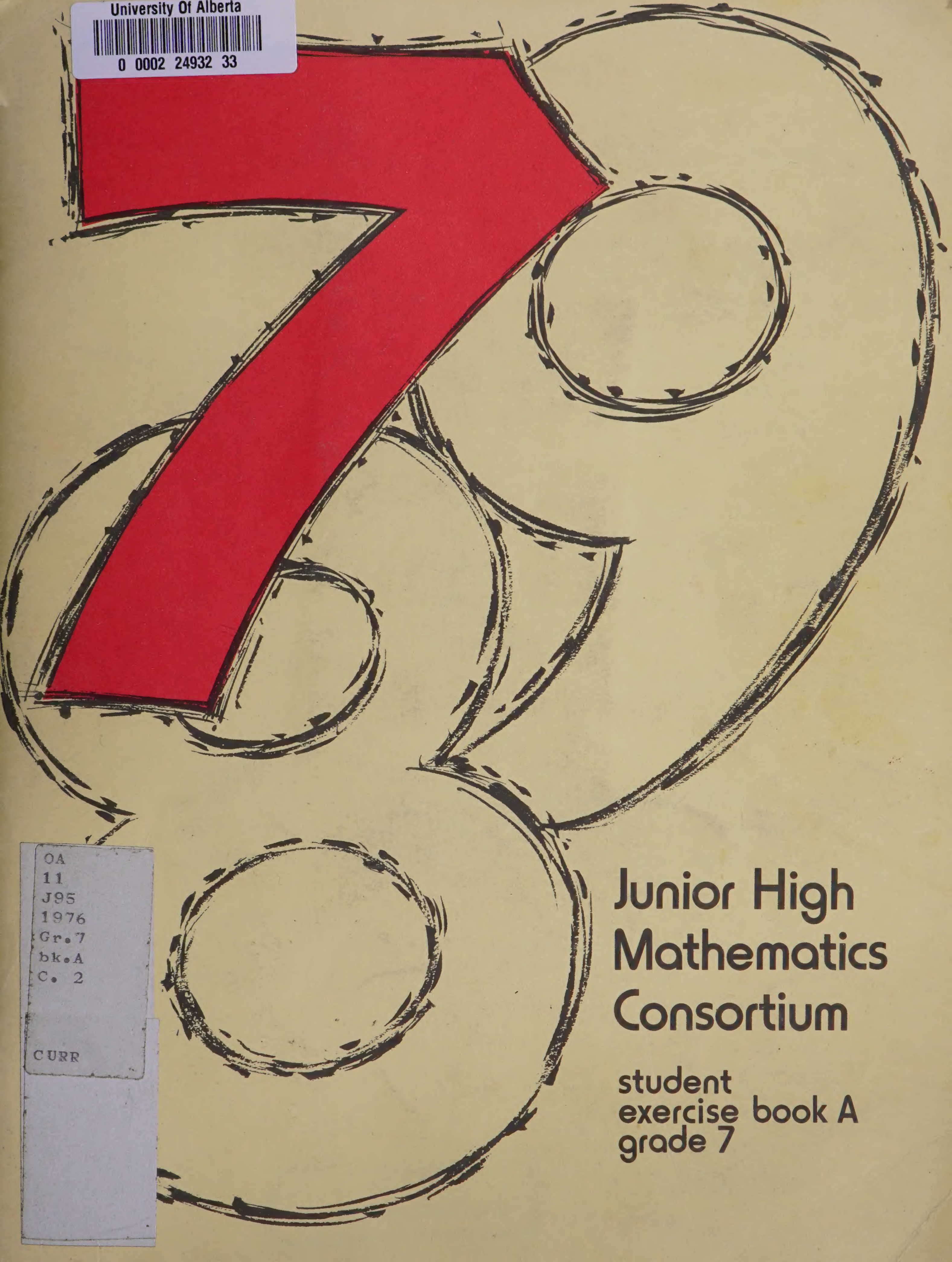

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HOW TO STUDY MATHEMATICS

To learn mathematics you must develop good study habits. The following suggestions should be of help:

1. Read carefully and deliberately.

   Read the material slowly several times for each word and symbol is important and many thoughts are condensed into a few statements.

2. Think with pencil and scratch paper.

   Test out your ideas on paper. Work out all examples even if they have been worked out in the text. "Dig out" the facts. Get started with pencil and paper, don't just sit.

3. Be independent.

   Work without assistance. Ask questions only when they are necessary. If you have tried hard, and still do not understand, ask for help - don't wait too long. Don't be afraid of sounding "dumb" when you ask questions.

4. Listen in class.

   Pay careful attention to the fine points and to the basic principles as they are discussed.

5. Persevere.

   Do not become frustrated if at first you do not understand the topic. Stick with it ! Insight often comes suddenly. If you are making no progress, put the problem aside and attack it again later.

6. Take time to reflect.

   It takes time for some ideas in mathematics to "soak in". Think about them for awhile.

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7. Concentrate on fundamentals.
   Do not try to learn mathematics by memorizing examples. Concentrate on the fundamental principles and definitions and try to see how these are applied.

8. Be neat and accurate.
   Practice accuracy and neatness until they become a habit. Keep your work well organized - your work should always be in the same place.

9. Take time to do your work and do it on time.
   Do your homework regularly - no excuses for not having it done will be accepted. Make up work that you have missed. Do not wait until the last minute to do your work and then rush through it. It's not enough to just get the answers; you have to understand the underlying principles.

10. Become actively involved.
    Mathematics is not an activity for the intellectually lazy. It requires a strong, steady effort on your part. You cannot learn mathematics by watching others doing it!

There is no extra pay for working hard or conscientiously doing your homework. The "reward" you receive is that you learn it!

- Adapted from "The Mathematics Teacher"

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LEVEL Z

UNIT I

SET THEORY

UNIT I - SET THEORY

CONCEPT CHECK LIST

When you have completed this unit, you should be able to:

1. Tell what sets are.
2. Tabulate sets using proper notation.
3. Tabulate all the subsets of a given set.
4. Draw Venn diagrams for sets and subsets.
5. Recognize and define equal and equivalent sets.
6. Recognize and define finite and infinite sets.

EXERCISES OBJECTIVE NO. 1 - 2

I. WRITE THE MEANING FOR EACH OF THE FOLLOWING SYMBOLS:

1. ...
2. {a, b}
3. ∈
4. ∅

To Tabulate is to List in Braces

II. TRANSLATE INTO WORDS:

1. Volkswagen ∈ B
2. d ∈ A
3. C = ∅

III. DESCRIBE EACH OF THE FOLLOWING:

1. C = {60, 61, 62,...68}
   The set of whole numbers from 60 through 68
2. A = {a, b, c,...z}
3. B = {Volkswagen, Toyota, Datsun}
4. D = {Paris, Washington, Ottawa, Tokyo}
5. E = {B. C., Alta., Sask.}
6. F = {St. Paul, Leduc, Spruce Grove, Ft. McMurray}
7. G = {Oilers, Toros, Blazers, Jets}
8. H = {3, 6, 9,...}
9. I = {2, 4, 6, 8}

IV. TABULATE:

1. The set of the first five natural numbers
   {1, 2, 3, 4, 5}
2. The set of 5 of your favorite T.V. programs
3. The set of whole numbers between 14 and 15
4. The set of girls seven feet tall
5. The set of the first 3 numbers divisible by 5

V. WRITE THE NUMBER OF ELEMENTS IN EACH OF THE FOLLOWING SETS:

1. A = {x,y,z} ______
2. B = {3,7} ______
3. C = { } ______
4. D = {0} ______
5. E = {□,∇,○,Δ} ______
6. F = {3,*,L,†} ______
7. G = {6,7,8,...17} ______

I. SELECT THE SETS THAT CONTAIN ONLY THE ELEMENTS FROM THE UNIVERSE OF NORTH AMERICAN CARS.

A = {Chev., Toyota, Pontiac, Buick}

B = {Ford, Meteor, Chev.}

C = {Datsun, Volkswagen, Austin}

D = {Ford, Mustang, Pinto}

E = {Vega, Rambler, Olds, Camaro}

II. SELECT THE SETS OF CITIES THAT CONTAIN ONLY THE ELEMENTS FROM THE UNIVERSE OF THE CITIES EAST OF EDMONTON.

A = {Winnipeg}

B = {Halifax, Vancouver, Victoria}

C = {Regina, Winnipeg, Montreal, Toronto}

III. SELECT THE SETS THAT CONTAIN FOOTBALL TEAMS IN THE CANADIAN FOOTBALL LEAGUE.

X = {Edmonton, Calgary}

Y = {Vancouver, Regina, Winnipeg}

Z = {Montreal, Toronto, Hamilton}

S = {Leduc, Red Deer, Grande Prairie}

T = {Edson, Halifax, Calgary, Ponoka}

IV. SELECT THE SETS THAT CONTAIN ONLY ODD NUMBERS.

R = {1, 2, 3, 4}

O = {3, 6, 9}

N = {2, 4, 6, 8}

S = { }

Q = {1, 3, 5, 7}

Secret Message

V. PLACE THE LETTER OF THE SETS IN COLUMN 2 IN THE APPROPRIATE BLANKS IN COLUMN 1. IF YOU DO IT CORRECTLY, THERE WILL BE A SECRET MESSAGE FOR YOU.

UNIVERSE

__M__ 1. Food

_____ 2. Records

_____ 3. Cars

_____ 4. Movie Stars

_____ 5. T. V. Programs

_____ 6. Hockey Players

_____ 7. 10-Speeds

_____ 8. vehicles with 4 wheels

_____ 9. Skaters

_____ 10. Holidays

_____ 11. Football Player

_____ 12. Books

_____ 13. Machines With Motors

_____ 14. Male Hollywood Stars

_____ 15. Hockey Forwards

_____ 16. Beds

_____ 17. 2-Wheel Machines

_____ 18. Singers

_____ 19. Letters Of The Alphabet

_____ 20. People Who Score Goals

_____ 21. Days Schools Are Closed

_____ 22. Girls' Clothes

_____ 23. People Who Use Hockey Sticks

SETS

A = {LP, 45}

C = {Sesame Street, Disneyland}

E = {Bobby Hull, Gordie Howe, Bobby Orr}

F = {Novels, Pocket}

H = {Paul Newman, Steve McQueen}

I = {Cat Stevens, Dionne Warwick}

M = {Hot Dogs, Hamburgers}

N = {CCM, Peugoet, Raleigh}

O = {George McGowan}

R = {Labour Day, May 24th, Christmas}

S = {Dress, Skirt, Nylons}

T = {Ford, Chev., Buick}

U = {Bunks, Double, Single}

V = {a, b, c, d, e, f, g}

EXERCISES OBJECTIVE NO. 4

I. LIST ALL THE SUBSETS OF:

1. $A = \{1,2,3\}$ - $\{1,2,3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{\ \}, \{1\}, \{2\}, \{3\}$
2. $B = \{△, ○, □, ⏢\}$
3. $C = \{\text{dog, cat}\}$
4. $D = \{\text{Bob}\}$
5. $E = \{\ \}$

II. LIST THE PROPER SUBSETS OF:

1. $F = \{\%, \#\}$
2. $G = \{6,7,8\}$

*III. LIST THE SUBSETS OF $V = \{a,e,i,o,u\}$

IV. $A = \{2,4,5,7,8\}$ $C = \{\ \}$ $E = \{5,7,8,2\}$

$B = \{2,4\}$ $D = \{6,7,8,5\}$ $F = \{4\}$

THE FOLLOWING STATEMENTS REFER TO THE 6 SETS TABULATED ABOVE. THEY ARE EITHER TRUE OR FALSE. PLACE 'T' or 'F' IN THE APPROPRIATE BLANKS.

1. $B \subset A$ ____
2. $C \subset A$ ____
3. $D \subset A$ ____
4. $E \subset A$ ____
5. $F \subset A$ ____
6. $F \subset B$ ____
7. $F \subset E$ ____
8. $F \subset D$ ____
9. $C \subset F$ ____
10. $B \subset E$ ____
11. $E \subset B$ ____
12. $A \subset E$ ____
13. $C \subset D$ ____
14. $E \subset D$ ____
15. $F \subset F$ ____

V. a) CROSS OUT THE SETS WHICH ARE NOT SUBSETS OF $R = \{2, 4, 6\}$. THE REMAINING SUBSETS SHOULD SPELL YOUR FAVORITE WORD.

$C = \{0,1\}$
$M = \{6,4,2\}$
$B = \{1,2\}$
$D = \{8,12\}$
$A = \{\ \}$
$E = \{3,6,4\}$
$X = \{104,106\}$
$T = \{6\}$
$Y = \{2,4,8\}$ $H = \{4\}$

b) WRITE THE RELATIONSHIP BETWEEN 'R' AND IT'S SUBSETS USING CORRECT NOTATION. eg. $H \subset R$

____________ ____________ ____________

* $\{\ \}$ IS A SUBSET OF EVERY SET *

* A SET IS NOT * A PROPER SUBSET OF ITSELF *

EXERCISES OBJECTIVE NO. 5

I. MAKE A VENN DIAGRAM FOR SETS A AND B

U = set of all teachers in the school

A = set of all math teachers in the school

B = set of all Grade 7 math teachers in the school

II. MAKE A VENN DIAGRAM FOR SETS C AND D.

U = set of all grade 7 students in Alberta

C = set of all grade 7's in your room

D = set of all female grade 7's in your room

III. USE VENN DIAGRAMS TO SHOW THE RELATIONSHIP BETWEEN THE FOLLOWING SETS. WRITE THE ELEMENTS IN THE PROPER CIRCLES.

1. $\{3, 4, 6, 8, 10\}$ and $\{6, 10\}$ U = $\{1, 2, 3 \ldots\}$
2. $\{W, S\}$ and $\{W, S, T, X\}$ U = Alphabet
3. $\{2, 5, 6, 7\}$ and $\{7, 5, 2, 6\}$ U = $\{1, 2, 3, \ldots\}$
4. {chocolate, milk, shake} and {shake, chocolate, milk}

   U = English words
5. The set (U) of letters in the English alphabet; the set (A) of vowels in the English alphabet.
6. The set (M) of the months of the year beginning with J. Universe is the set of months in one year.

IV. DRAW A VENN DIAGRAM REPRESENTING $A \subset B$.

EXERCISES OBJECTIVE NO. 6 & 7

I. Place an X in the column or columns to show when the sets are equal, equivalent, or neither equal nor equivalent.

		EQUAL	EQUIV.	NEITHER
	{3, 6, 9, 12}, {6, 9, 12, 3}	X	X	
1.	{a, b, c}, {2, 9, 5, 4}			
2.	{○, △, □, ◇}, {boy, girl, dog, cat}			
3.	{a, e, i, o, u}, {u, a, i, o, e}			
4.	{Bob, Bill, Sue}, {Shelly, Gregg, Terry}			
5.	{heads in your room}, {people in your room}			
6.	{records, food, sleep}, {dance, holidays, shows}			
7.	{4}, {1, 2, 3, 4}			
8.	{football, hockey, baseball}, {baseball, hockey, football}			
9.	{dress, pattern, cooking}, {sewing, recipe, dish}			
10.	{10, 11, 12}, {10, 11, 12, ...}			

ALL EQUAL SETS
ARE EQUIVALENT

EXERCISES: OBJECTIVE NOS. 6 & 7

II. What do you do if you are having difficulty with math?

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

There is a box in the above grid for each question below. If the question has 2 equal sets, shade the same numbered box in the grid as the question. When you have finished, you will have a picture for the answer to the original question.

1. {○ △ □} {○ ▱ □}
2. {1, 2, 3} {2, 3, 4}
3. {1, 2, 3} {3, 2, 1}
4. {a, b, c} {b, a, c}
5. {boy} {b, o, y}
6, { } {o}
7. {dog, cat} {pets}
8. {bikes, records} {2}
9. {a, b, c, f} {f, a, c, b}
10. {Sam,Sal,Joe} {Joe,Sam,Sal}
11. {ice cream, hamburgers} {ice cream, hamburgers}
12. {T.V., radio, shows} {radio, T.V., shows}
13. { } { }
14. {10, 20, 30} {30, 10, 20}
15. {dollar, penny, quarter} {quarter, penny, dollar}
16. {math, teacher, great} {great, math, teacher}

$C = \{1, 3, 6, 9\}$ $D = \{1, 2, 3, \ldots\}$

$A = \{51, 107\}$ $O = \{10, 100, 1000, \ldots\}$

$T = \{6, 12, 18\}$ $G = \{2, 4, 6, \ldots\}$

I. Tabulate the next six elements of set D. $\{4,5,6,7,8,9\}$

II. Tabulate the next three elements of set O.

III. Tabulate the next six elements of set G.

IV. Label each of the following sets "F" if they are finite, and "I" if they are infinite:

(1) $\{2,4,6,8,10,12\}$

(2) $\{0,1,2,3,4,\ldots\}$

(3) The set of all the days of the week.

(4) The set of all the numbers greater than 20.

V. Refer to the sets at the top of the page.

(1) How many elements in set C above?

(2) How many elements in set A above?

(3) How many elements in set T above?

(4) The three sets C, A, T are ____________ sets.

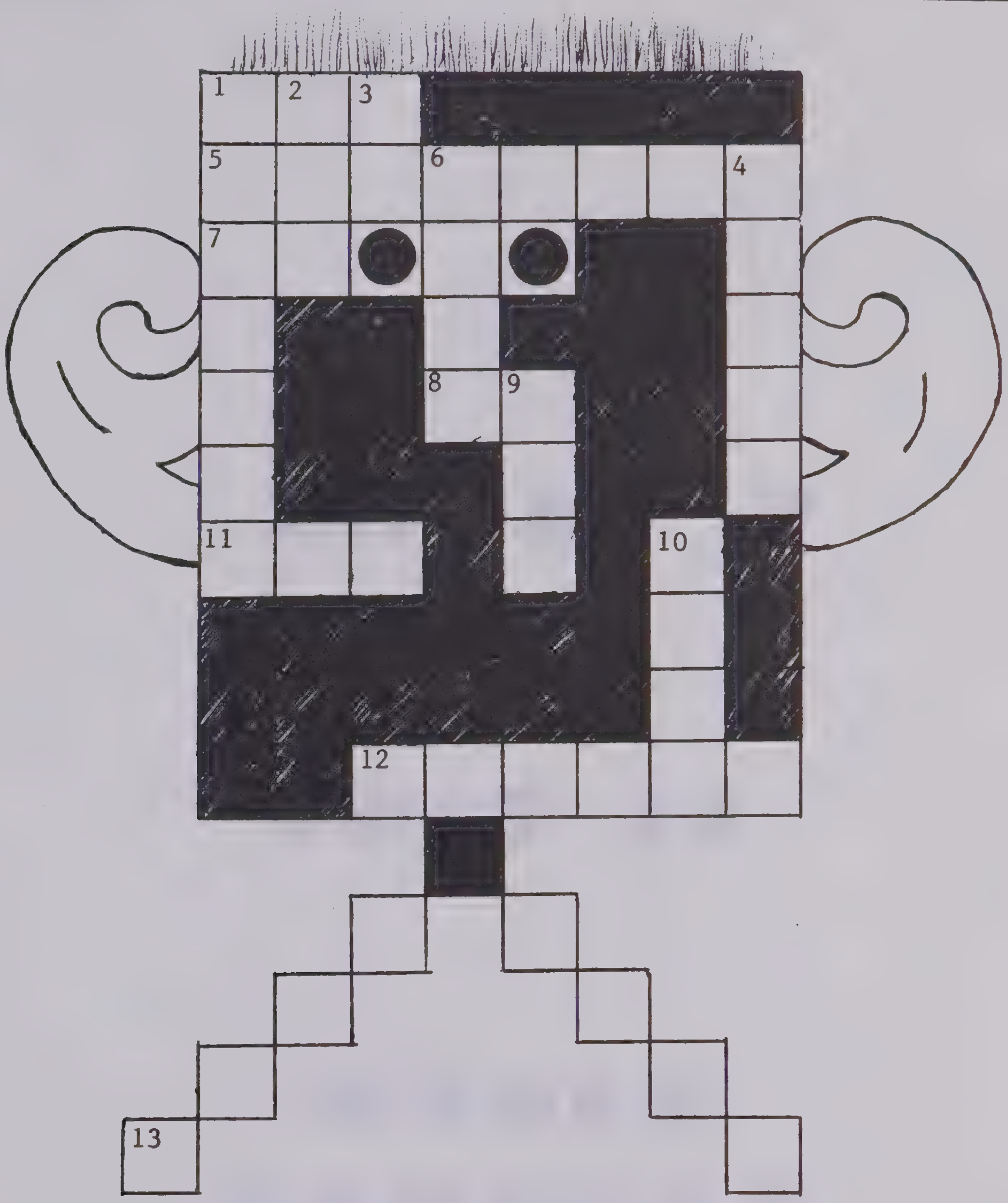
IV. Tabulate the elements of these infinite sets.

(1) The set of whole numbers greater than 10.

(2) The set of odd numbers.

(3) The set of numbers that end in 5.

I.



ACROSS:

1. A collection of things that have something in common.
5. A set that is usually represented by a rectangle.
7. C comes between them.
8. Not yes
11. $B=\{\star, \square, \Delta, \nabla, \rho, \circ\}$
    There are ___ elements in B.
12. A set is usually represented as a ____ within a Venn diagram.
13. You cannot count the elements of this set.

DOWN:

1. Part of a set (plural).
2. A finite set of elements has an ___________.
3. It spelled backwards.
4. $\{a, b, c\}$, $\{c, a, b\}$
   These sets are __________.
6. The name of the diagrams that illustrate sets.
9. $A = \{0\}$
   This set has ____ element.
10. Another name for an empty set.

LEVEL 7

UNIT II

WHOLE NUMBERS

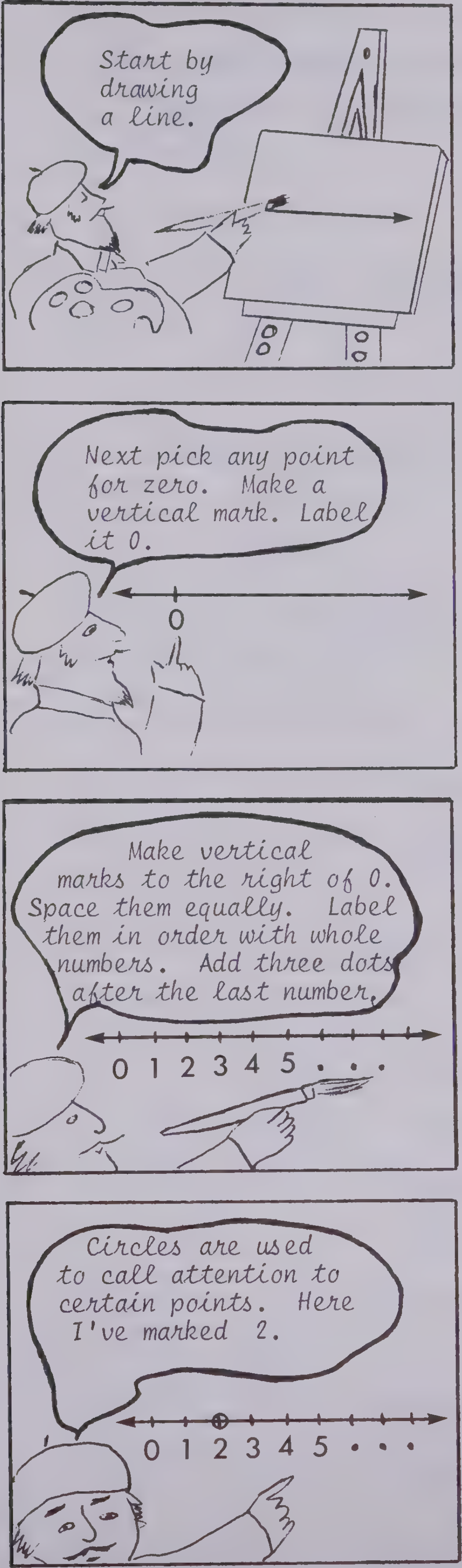
UNIT II - WHOLE NUMBERS

CONCEPT CHECK LIST

When you have completed this unit, you should be able to:

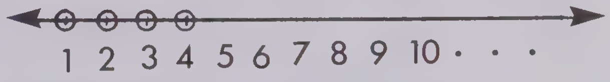
1. Tabulate the set of whole numbers
2. Compare the set of whole numbers with the set of natural numbers by
   (a) Tabulation
   (b) Graphing
3. Write the standard and expanded forms of whole numbers.
4. Compute with whole numbers. (Add, subtract, multiply, divide)
5. Apply the order of operations in computation.
6. Use zero properly in computation.
7. Evaluate expressions by substituting for the variable.
8. Solve conditions involving whole numbers.
   Types: $A + x = b$ $\quad$ $Ax + B = C$
   $Ax = B$ $\quad$ $Ax + Bx = C$
9. Verify the solutions of conditions
10. Translate English statements into mathematical expressions.
11. Write English statements for mathematical expressions.
12. Solve problems involving whole numbers.

GRAPHING WHOLE NUMBERS


Start by drawing a line.
Next pick any point for zero. Make a vertical mark. Label it 0.
0
Make vertical marks to the right of 0. Space them equally. Label them in order with whole numbers. Add three dots after the last number.
0 1 2 3 4 5 . . .
Circles are used to call attention to certain points. Here I've marked 2.
0 1 2 3 4 5 . . .

The Line Up

Graph the solution set on the NATURAL NUMBER LINE of all the numbers less than 5.



Solution Set: $\{1, 2, 3, 4\}$

Graph the following:

1. The natural numbers.
2. Whole numbers greater than 3.
3. The natural numbers less than 8.
4. The whole numbers greater than 4 and less than 5.
5. Whole numbers.
6. Natural numbers less than 1.
7. Whole numbers less than 1.

EXERCISES:

Expanded Form

OBJECTIVE NO. 3 & 4

NOTE: The SI system does not use commas but leaves a space.

Examples:

(a) Write in expanded form:

27 638 = (2 x 10 000) + (7 x 1000) + (6 x 100) + (3 x 10) + (8 x 1)

(b) Write in standard form:

(7 x 100 000) + (3 x 10 000) + (0 x 1000) + (6 x 100) + (0 x 10) + (5 x 1) = 730 605

(c) Write in word form:

1396 = One thousand three hundred ninety-six

1. Write in expanded form:

(a) 39
(b) 74
(c) 312
(d) 4000
(e) 357
(f) 6009
(g) 42 734
(h) 625 416
(i) 433
(j) 392

2. Write in expanded form:

(a) 5632
(b) 321
(c) 4134
(d) 34 435
(e) 4387
(f) 4 021 304
(g) 400 003
(h) 234 007
(i) 42 132
(j) 764 452 160

3. Write in word form:

(a) 4395
(b) 2 000 416
(c) 7600
(d) 5 900 000
(e) 538 738
(f) 4657

4. In the number 4 526 197 what is the place value of each digit?

5. Which digit in 1 375 426 represents the largest number? The smallest number?

6. Write in standard form:

   (a) (7 x 10 000) + (3 x 1000) + (0 x 100) + (5 x 10) + (6 x 1)

   (b) (8 x 1 000 000) + (5 x 100 000) + (3 x 10 000) + (2 x 1000) + (6 x 100) + (1 x 10) + (9 x 1)

   (c) (5 x 10 000) + (3 x 1000) + (9 x 100) + (6 x 10) + (0 x 1)

   (d) (4 x 1) + (3 x 10) + (6 x 100) + (5 x 1000) + (7 x 10 000) + (2 x 100 000)

   (e) (0 x 1) + (0 x 10) + (0 x 100) + (0 x 1000) + (4 x 10 000)

7. Write in standard form:

   (a) (3 x 10 x 10 x 10) + (5 x 10 x 1 0) + (0 x 10) + (3 x 1)

   (b) (6 x 10 x 10 x 10) + (2 x 10 x 10) + (8 x 10) + (0 x 1)

   (c) (4 x 10 x 10 x 10 x 10 x 10) + (7 x 10 x 10 x 10 x 10) + (8 x 10 x 10 x 10)

   (d) (4 x 1) + (4 x 10) + (6 x 10 x 10) + (2 x 10 x 10 x 10) +(8 x 10 x 10 x 10 x 10)

   (e) (1 x 1) + (0 x 10) + (2 x 10 x 10) + (0 x 10 x 10 x 10) + (4 x 10 x 10 x 10 x 10) + (3 x 10 x 10 x 10 x 10 x 10)

*8. Give the number in standard form:

   (a) 10^4

   (b) 10^5

   (c) 10^0

   (d) 10^2

   (e) 10^1

   (f) 10^9

   (g) 10^3

   (h) 10^7

   (i) 10^8

   (j) 10^6

*9. Write in exponential form:

(a) $10 \times 10 \times 10$

(b) 10×10

(c) $10 \times 10 \times 10 \times 10 \times 10$

(d) $10 \times 10 \times 10 \times 10$

(e) $10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

*10. Write in standard form:

(a) $(8 \times 10^4) + (5 \times 10^3) + (0 \times 10^2) + (4 \times 10^1) + (6 \times 10^0)$

(b) $(8 \times 10^6) + (6 \times 10^5) + (7 \times 10^4) + (4 \times 10^3) + (6 \times 10^2)$
$+ (1 \times 10^1) + (3 \times 10^0)$

(c) $(5 \times 10^4) + (4 \times 10^3) + (8 \times 10^2) + (8 \times 10^1) + (0 \times 10^0)$

(d) $(3 \times 10^0) + (5 \times 10^1) + (6 \times 10^2) + (8 \times 10^3) + (6 \times 10^4)$
$+ (7 \times 10^5)$

(e) $(7 \times 10^0) + (3 \times 10^1) + (2 \times 10^2) + (6 \times 10^3) + (8 \times 10^4)$

EXERCISES:

Addition

OBJECTIVE NO. 5

1. 34
25

2. 67
32

3. 20
58

4. 63
26

5. 42
27
19

6. 25
50
83

7. 86
92
58

8. 65
7
94

9. 34
79
88

10. 7
28
72

11. 582
143
214

12. 861
495
827

13. 779
698
579

14. 926
15
658

15. 639
852
543

16. 34832
11913
22741
10420

17. 56834
67509
31915
47628

18. 42763
96833
47485
92739

19. 6445
95214
87
1756

20. 76542
81276
998
5823

21. 698523
34769
178
9874
968452
789347
59791

22. 487944
921593
678105
637050
986967
369725
917862

23. 2459630
25400
580575
243125
8549
9783484
15338

24. 4369565
7436859
3050762
4598083
6452136
7587327
3967009

25. 97
2
421
0
33

26. 427
95

27. 39
72

28. 348
83
592
203

29. 84953
48769
34822

30. 46321
34
502485
2981

31. 30
733
49
4892

32. 3 + 36 + 15 + 294 =

33. 45 + 327 =

34. 10 + 291 + 0 + 84 =

35. x + y = z

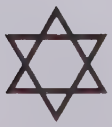
x, y and z represent an addition problem.

x and y are called

____

and z is called

____



EXERCISES:

Subtraction

OBJECTIVE NO. 5

1.	85 -61	2.	66 -35	3.	98 -26
4.	49 -15	5.	57 -23	6.	475 -132
7.	978 -642	8.	362 -150	9.	549 -325
10.	853 -721	11.	8654 -2431	12.	4296 -3003
13.	6582 -4172	14.	9728 -6215	15.	7849 -3812
16.	38762 -26521	17.	93596 -61593	18.	55706 -52304
19.	45383 -32162	20.	79648 -36136	21.	645987 -314265
22.	705961 -536809	23.	658235 -621791	24.	450000 -328542
25.	532645 - 2867	26.	2963475 -1724133	27.	7694251 - 86206
28.	2500000 -1758625	29.	4000000 -2950966	30.	349 - 24
31.	483 - 74	32.	98491 - 8993	33.	62461 - 5
34.	903 - 75	35.	10031 - 34	36.	27604 - 8875
37.	94 - 0 =	38.	4241 - 52 =	39.	342 - 125 =

40. x - y = z

x, y and z each represent a certain part of a subtraction problem. We have names for these parts.

x is called______________
y is called______________
z is called______________

EXERCISES: OBJECTIVE NO. 5

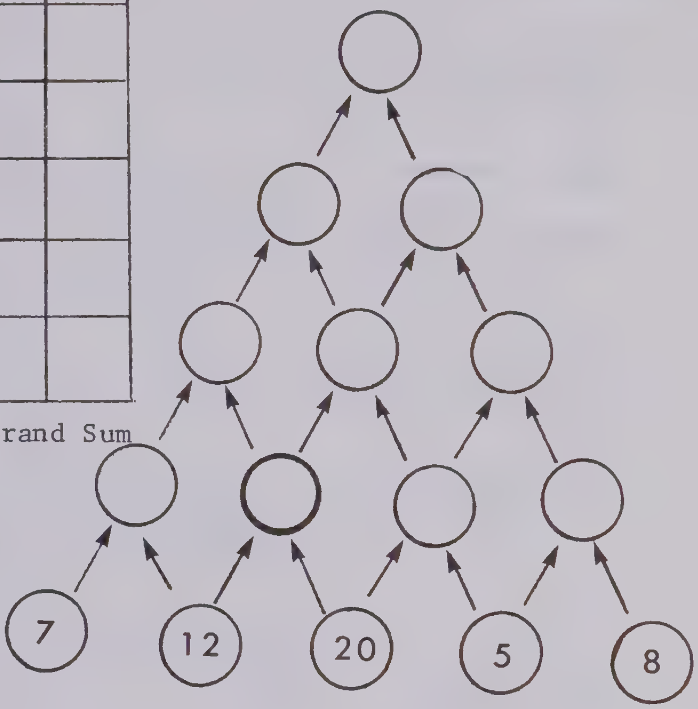
Please do the following pages in your note book!

1. Complete the Chart

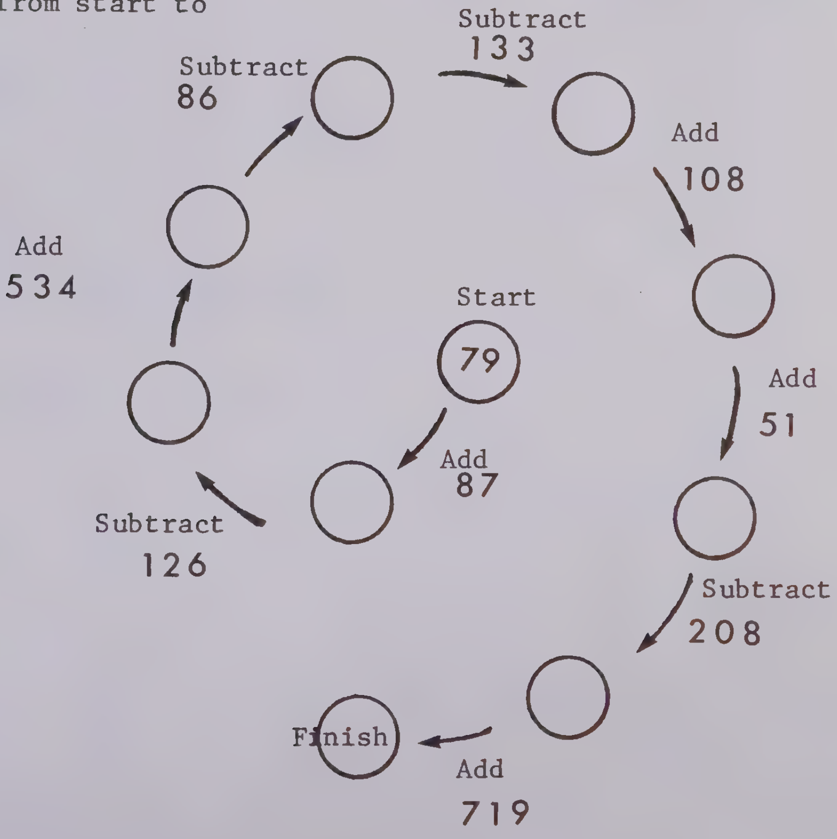
+	2	9	18	10	5	sum
6						
13						
1						
4						
0						
sum						

Grand Sum

2. Add each pair of numbers to get the number above. Work your way to the top.



3. Follow the path from start to finish.

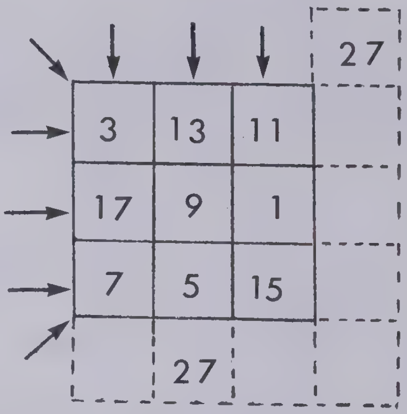


EXERCISES: (CONT'D)

Magic Squares

OBJECTIVE NO. 5

In a *magic square*, the sums of the numbers in each row, each column, and each diagonal are equal. This sum is called the *magic constant*.



3	13	11
17	9	1
7	5	15

1. Show by adding that the example at the right is a magic square.

   Magic constant = ____________

2. Complete the magic squares.

		16
10		22

Magic constant = 39.

4		12
	6	

Magic constant = 30.

Challenge

3. It's your turn to make a magic square. Use each of the numbers 1 through 9.

Magic constant = ____________

4. Complete the magic squares:

(a)

19		2	16
	12	13	
11			14
		17	

CHALLENGE Magic constant = 40.

(b)

	4		
7	15		10
		9	17
5			2

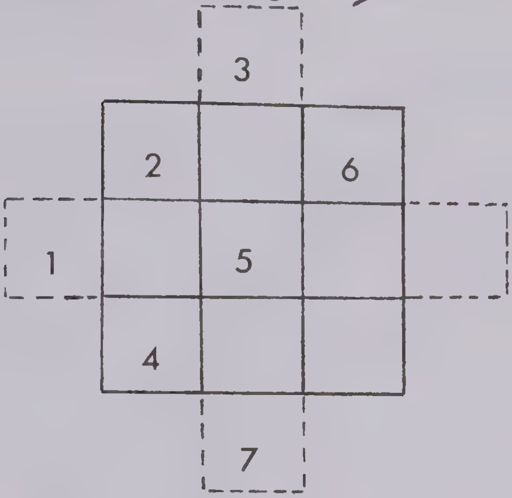
Magic constant = 48.

5. Fill in the magic square. Use each of the numbers 1 through 16.

Magic constant = 34.

The problems below show a method for making magic squares. Can you figure it out? Use the pattern on the left to make a magic square on the right.

1. a) Complete the pattern. Use the consecutive whole numbers 1 through 9.



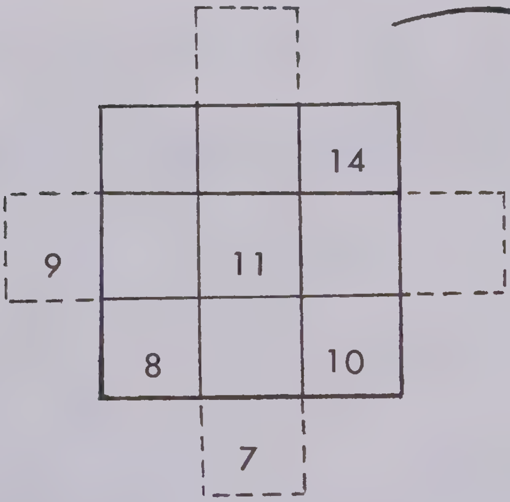
b) Complete the magic square.

2		6
	5	
4		

Magic constant = ____________

Do you see where the numbers in the broken-line boxes went?

2. a) Complete the pattern. Use the consecutive whole numbers 7 through 15.



b) Complete the magic square.

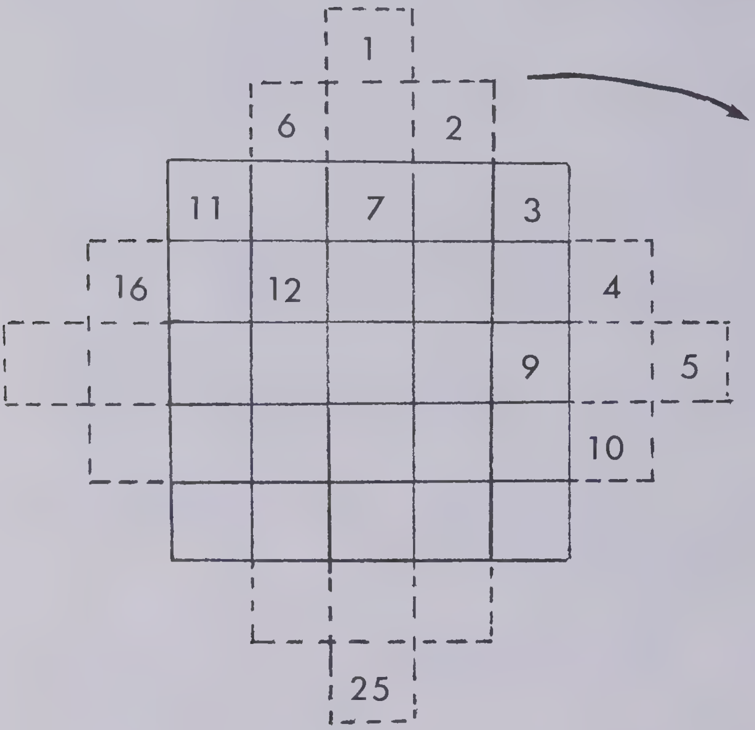
		14
	11	
8		10

Magic constant = ____________

Use the pattern on the left to make a magic square on the right.

1. a) Complete the pattern. Use the consecutive whole numbers 1 through 25.

   b) Now complete the magic square. (Hint: Where did the 4, 10 and 5 go?)

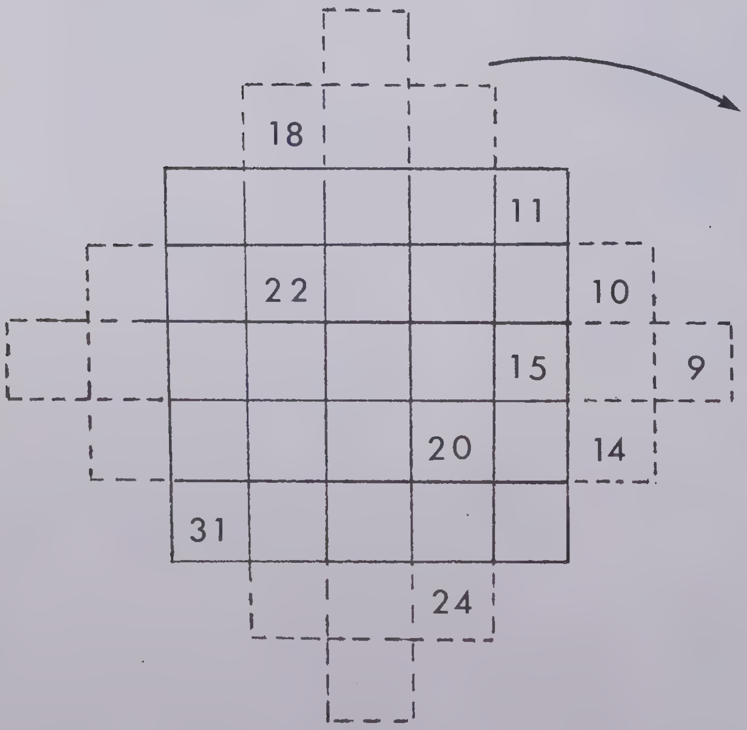


11		7		3
4	12			
	5			9
10				

Magic constant = ________

2. a) Use the consecutive whole numbers 9 through 33 to complete the pattern.

   b) Complete the magic square.



				11
	22			
				15
			20	

Magic constant = ________

Palindromes

Palindromes read the same way front or back.

Napoleon was born in 1769.

	1769	
Reverse 1769.	+ 9671	
Add.	11440	Not a palindrome
Reverse 11440.	+ 04411	
Add.	15851	A palindrome

- It took two reversals to get a palindrome.

1. In what year were you born? _______

   How many reversals are needed to get a palindrome? _____________

2. Try this with the year of birth of other members of your family.

   Who has the most reversals? ___________

3. Now try some famous people.

NAME	YEAR BORN	PALINDROME	NUMBER OF REVERSALS
Napoleon	1769		
Christopher Columbus	1446		
Sitting Bull	1834		
George Washington Carver	1864		
Babe Ruth	1895		
Helen Keller	1880		
Billie Holiday	1915		
Dwight Eisenhower	1890		
Albert Einstein	1879		
Elizabeth I	1533		
Abraham Lincoln	1809		
Shakespeare	1564		

Here comes the troublemaker!

Jesse James	1847		

4. There are 22 two-digit dates in a 31-day month. Which dates require more than one reversal to give you a palindrome? ________________

EXERCISES:

Multiplication

OBJECTIVE NO. 6

1. 2304 x 200

2. 900 x 4

3. 289 x 74

4. 3492 x 8

5. 95 x 87

6. 1432 x 207

7. 2093 x 51

8. 5831 x 0

9. 562 x 1

10. 3089 x 47 =

11. 43 x 72

12. 57 x 38

13. 813 x 74

14. 1638 x 43

15. 8536 x 91

16. 283 x 164

17. 342 x 193

18. 8204 x 672

19. 91625 x 405

20. 49872 x 5003

21. 38976 x 1039

22. 2826 x 32405

23. 38391 x 46145

24. 14638 x 247

25. a x b = c

a is called ____________

b is called ____________

c is called ____________

26. 76 x 36

27. 2876 x 7

28. 6478 x 24

29. 8632 x 73

30. 6389 x 49

31. 52890 x 58

32. 8249 x 407

33. 1960 x 260

34. 3769 x 93

35. 6475 x 25

36. 47036 x 46

37. 5700 x 809

38. 30087 x 36

39. 51608 x 29

40. Complete the following chart:

	×	9	18	27	36	45	54		
									Sums
	9						486		
	18								
	27								
	36								
	45								
	54	486							
Sums									Grand Sum

Add the products in each column and place the sum in the box below the column. Find the grand sum.

EXERCISES: Quaint Quotients OBJECTIVE NO. 6

1. $8\overline{)6496}$

2. $3\overline{)91}$

3. $45\overline{)901}$

4. $781\overline{)936498}$

5. $42\overline{)98062}$

6. $1\overline{)61}$

7. $14\overline{)84}$

8. $83\overline{)98763}$

9. $41\overline{)0}$

10. $978\overline{)493269}$

11. $\begin{array}{r} z \\ x\overline{)y} \end{array}$

x is called the ____________

y is called the ____________

z is called the ____________

12. $76\overline{)49172}$

13. $22\overline{)19822}$

14. $26\overline{)543}$

15. $73\overline{)44239}$

16. $6\overline{)84012}$

17. $8\overline{)86743}$

18. $7\overline{)5876}$

19. 60 309 ÷ 9 =

20. 18 639 ÷ 19 =

21. 7864 ÷ 32 =

22. 6785 ÷ 83 =

23. 71 825 ÷ 72 =

24. 867 166 ÷ 604 =

25. 84 864 ÷ 416 =

26. 86 526 ÷ 506 =

27. 85 617 ÷ 652 =

Choose any one of the problems below. Estimate the product. Then find the exact product. Cross out the product on the *MATHO* card.

You should try to cross out five products in a row or five in a column or five on a diagonal. The first player to do so wins. Do as few problems as possible.

1. 157 x 276 = ________

2. 37 x 52 = ________

3. 216 x 941 = ________

4. 113 x 19 = ________

5. 87 x 26 = ________

6. 356 x 21 = ________

7. 134 x 28 = ________

8. 351 x 474 = ________

9. 27 x 91 = ________

10. 225 x 92 = ________

11. 128 x 39 = ________

12. 425 x 68 = ________

13. 64 x 98 = ________

14. 719 x 532 = ________

15. 31 x 206 = ________

16. 631 x 48 = ________

17. 75 x 54 = ________

18. 83 x 47 = ________

19. 408 x 701 = ________

20. 782 x 52 = ________

21. 627 x 811 = ________

22. 17 x 32 = ________

23. 832 x 54 = ________

24. 572 x 44 = ________

25. 12 x 72 = ________

MATHO

3752	4050	44 928	1924	286 008
3901	203 256	20 700	2147	544
166 374	7476	43 332	28 900	40 664
2262	25 168	4992	508 497	6272
30 288	2457	382 508	864	6386

The Square Zero

YOU WILL NEED: scissors, a ruler

There are eight polygons below. You can see only four of them right now. The other four are incomplete.

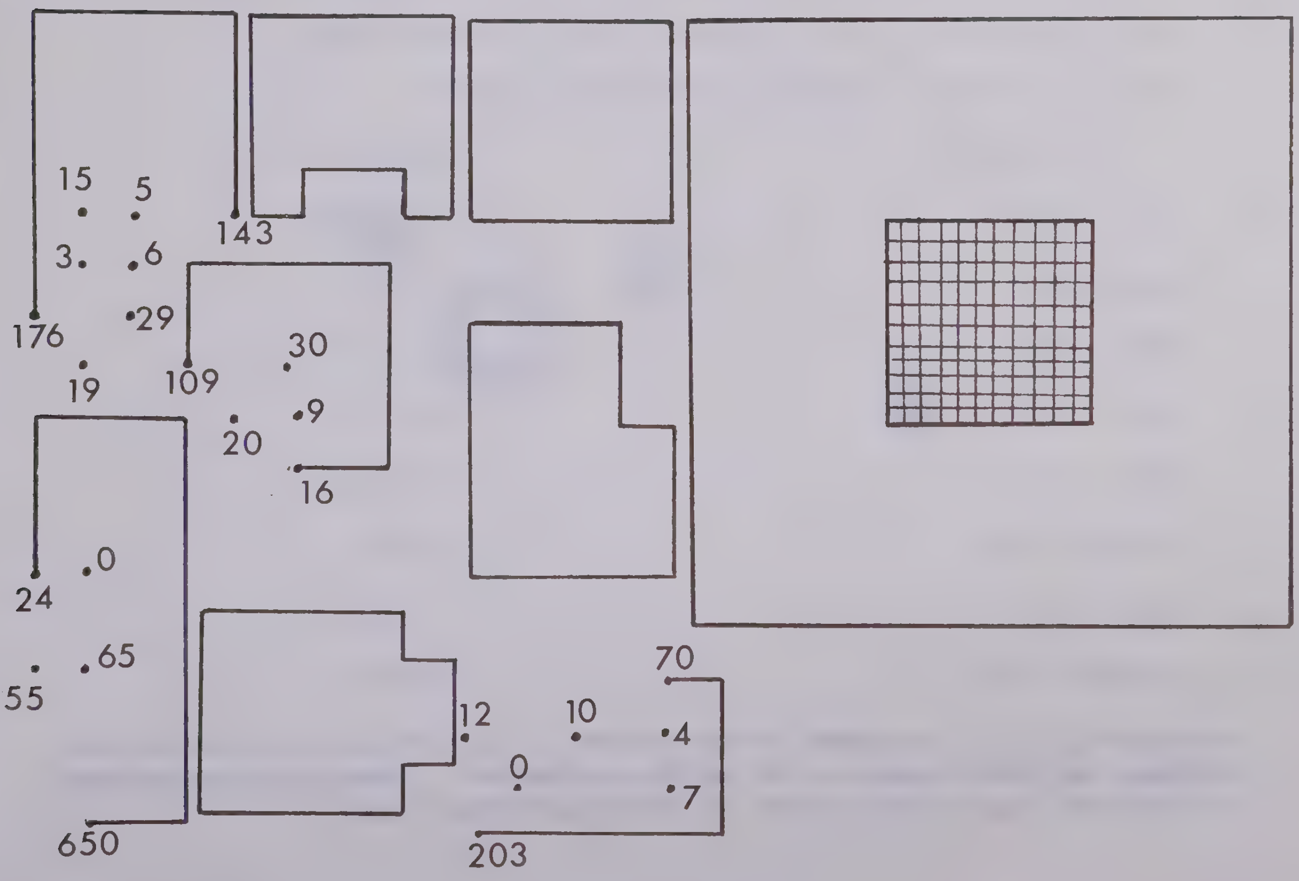
YOUR JOB:

To complete the polygons.
Then fit all eight polygons together to make a square zero.

HERE'S WHAT YOU DO:

First do the division problems below.
The quotients and remainders are shown next to some of the dots below.
Connect each quotient with the remainder.
When all eight polygons are complete, cut them out and fit them together. They should cover the square zero at the right.

1. 209 ÷ 36 = ____________
2. 576 ÷ 24 = ____________
3. 814 ÷ 49 = ____________
4. 784 ÷ 65 = ____________
5. 8871 ÷ 62 = ____________
6. 2524 ÷ 36 = ____________
7. 17 453 ÷ 99 = ____________
8. 7150 ÷ 11 = ____________
9. 6352 ÷ 58 = ____________
10. 15 643 ÷ 77 = ____________

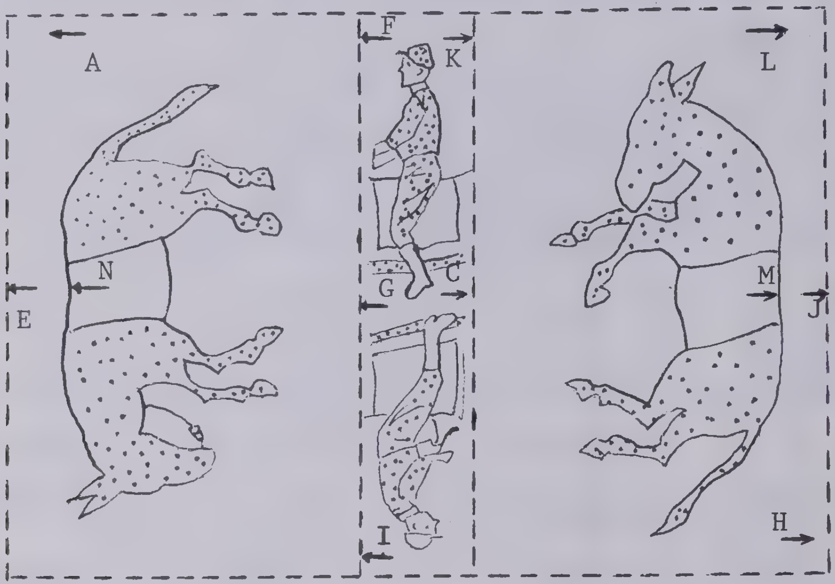


Leaping Donkeys

1. Sam Loyd was a famous American chess player who lived in the nineteenth century. He is the one who invented the game of Parcheesi.

   Sam loved to make up puzzles like the one below. It looks like a simple puzzle. See if you can solve it.

   Cut out the three rectangles along the broken lines. Without doing any more cutting or folding, arrange the three rectangles so that the jockeys are riding the two donkeys.



2. You don't think it can be done? Here's a little help.

   First do all the division problems in column 1.

COLUMN 1	COLUMN 2
A. 476 ÷ 27 =	I. 475 R18
B. 598 ÷ 32 =	J. 46 R21
C. 1980 ÷ 86 =	K. 17 R17
D. 2201 ÷ 12 =	L. 453
E. 2735 ÷ 59 =	M. 237 R4
F. 10 419 ÷ 23 =	N. 23 R2
G. 2137 ÷ 9 =	O. 18 R22
H. 30 893 ÷ 65 =	P. 183 R5

The answers to the problems are in column 2. The letters for six of the problems and their answers are on the rectangles. Arrange the rectangles so that the tips of the arrows of matching letters touch.

Challenge: Do You Know Your Terms

1. Given: addend = 535
   sum = 912

   Find the other addend.

2. Given: subtrahend = 906
   difference = 409

   Find the minuend.

3. Given: multiplicand = 894
   product = 63 474

   Find the multiplier.

4. Given: divisor = 1736
   quotient = 28

   Find the dividend.

5. Given: product = 40 152
   multiplier = 84

   Find the multiplicand.

6. Given: sum = 751
   addend = 245

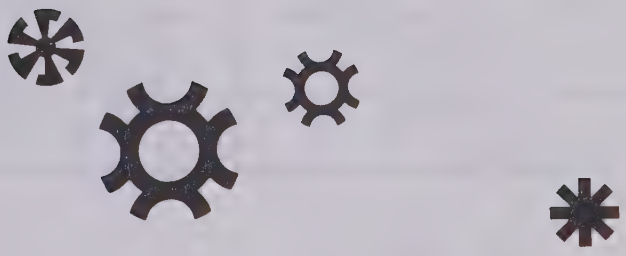
   Find the other addend.

7. Given: dividend = 2738
   quotient = 37

   Find the divisor.

8. Given: difference = 777
   minuend = 838

   Find the subtrahend.



Review

This is a crossnumber puzzle. Do all the *ACROSS* problems and all the *DOWN* problems. Your *ACROSS* answers and your *DOWN* answers will fit together if they are correct. If they don't agree, look for your mistake.

1	2	3	4	5	6	▨	7	8	▨	9
10				▨	11	12		▨	13	
14			▨	15			▨	16		
17		▨	18			▨	19			▨
20	▨	21			▨	22			▨	23
▨	24			▨	25			▨	26	
27			▨	28			▨	29		
30		▨	31			▨	32			▨
33	▨	34			▨	35			▨	36
▨	37			▨	38			▨		39
40			▨	41			▨	42		

DOWN

1. 100 006 - 82 417
2. 155 x 25
3. 8478 ÷ 9
4. 1006 - 989
5. 308 ÷ 77
6. 1357 x 4
7. 2 x 7
8. 2 + 5
9. 40 500 - 39 664
12. 10 000 - 9937
13. 504 ÷ 2
15. 78 + 165
16. 440 ÷ 1
18. 9 x 19
19. 2 x 487
21. 1120 ÷ 2
22. 653 - 356
23. 74 256 - 73 939
24. 15 400 ÷ 77
25. 765 ÷ 3
26. 9160 - 8471
27. 540 - 3
28. 92 + 195
29. 87 696 ÷ 609
31. 526 + 74
32. 2772 ÷ 7
34. 349 x 1
35. 2 + 190 + 19
36. 174 x 1
37. 784 ÷ 28
38. 9 x 6
39. 124 ÷ 4
40. 1 000 000 - 999 994
41. 973 ÷ 139
42. 1 x 1

ACROSS

1. 74 316 + 64 829
7. 5 + 12
9. 3 + 5
10. 413 x 19
11. 95 + 369
13. 8 + 9 + 6
14. 20 020 ÷ 35
15. 8474 ÷ 38
16. 8 x 57
17. 7310 ÷ 86
18. 4 x 37
19. 53 + 889
20. 106 - 97
21. 1000 - 427
22. 6 x 45
23. 3 x 1
24. 290 - 29
25. 1 + 291 + 2
26. 1 + 55 + 5
27. 1500 ÷ 3
28. 100 000 - 99 743
29. 9724 ÷ 52
30. 7 + 23
31. 5 x 137
32. 1139 - 790
34. 188 + 119
35. 147 x 2
36. 1 x 1
37. 273 - 33
38. 6 + 510
39. 2516 ÷ 68
40. 900 - 211
41. 222 + 519
42. 10 + 95 + 9

In Math we say: $a \times 1 = 1 \times a = a$
i.e. $7 \times 1 = 1 \times 7 = 7$

The product of any whole number and 1 equals the whole number

We also say: $a + 0 = 0 + a = a$
i.e. $5 + 0 = 0 + 5 = 5$

The sum of any whole number and 0 equals the whole number

These numbers have a special name

REMEMBER

0 - the *IDENTITY* element for *ADDITION*
1 - the *IDENTITY* element for *MULTIPLICATION*

NOTE:

$0 \times 0 = 0$
$0 \times 1 = 0$
$0 \times 2 = 0$
$0 \times n = 0$

The product of zero and any whole number is zero. This is called the *ZERO PROPERTY*.

1. *ADD*

a) $1 + 0 = ?$
b) $0 + 5 = ?$
c) $14 - 0 = ?$
d) $14 - 0 = ?$
e) $247 + 0 = ?$
f) $0 + 0 = ?$
g) $70 + 0 = ?$
h) $83 - 0 = ?$

2. *MULTIPLY*

a) $3 \times 1 = ?$
b) $17 \times 1 = ?$
c) $1 \times 24 = ?$
d) $238 \times 1 = ?$
e) $1 \times 10\ 004 = ?$
f) $1 \times 56 = ?$

DIVISION BY ZERO

Recall: The *CHECK* for division is *QUOTIENT X DIVISOR = DIVIDEND*

eg. $\begin{array}{r} 3 \\ 4\overline{)\,12} \end{array}$ Check: $3 \times 4 = 12$

NOW: Assume that 0 goes into 8, n times - i.e. $\begin{array}{r} n \\ 0\overline{)\,8} \end{array}$

CHECK: $n \times 0 = 8$
$\therefore\ 0 = 8$

BUT the product of any whole number and zero = 0
$\therefore\ n \times 0 = 0$ is false
$\therefore$ Division by zero is *UNDEFINED!*

3. *DIVIDE*

a) $\frac{14}{0 \times 14} = ?$ 14
b) $8 \div 0 = ?$
c) $\frac{12}{(4 - 4)} = ?$
d) $\frac{5}{2\ (3 - 3)} = ?$
e) $24 \div \frac{(0 \times 16)}{8} = ?$
f) $\frac{27}{0} = ?$

Properties

COMMUTATIVE PROPERTY

a + b = b + a
3 + 4 = 4 + 3
a x b = b x a
3 x 4 = 4 x 3

The *commutative property* allows us to change the order of the numbers when we are ADDING OR MULTIPLYING.

ASSOCIATIVE PROPERTY

(a + b) + c = a + (b + c)
(5 + 4) + 3 = 5 + (4 + 3)
(a x b) x c = a x (b x c)
(5 x 4) x 3 = 5 x (4 x 3)

The *associative property* allows us to regroup the numbers differently when ADDING OR MULTIPLYING.

DISTRIBUTIVE PROPERTY

a (b + c) = ab + ac
5 (2 + 3) = 5 x 2 + 5 x 3
a (b - c) = ab - ac

The *distributive property* tells us to multiply each number in the brackets by the number outside.

---

1. Use the properties to evaluate the following mentally:
Change the order and regroup if necessary.
eg. 4 + 12 + 6 = 10 + 12
= 22

a) 7 + 9 + 3 = ?
b) 4 + 13 + 16 = ?
c) 15 + 23 + 25 = ?
d) 140 + 113 + 260 = ?
e) 12 + 25 + 75 = ?
f) 2 x 3 x 4 x 5 x 7 = ?
g) 3 + 6 + 7 + 4 = ?
h) 4 x 21 x 25 = ?
i) 35 + 12 + 5 + 8 =?
j) 50 x 12 x 2 = ?

2. Using the properties, solve the following:
eg. 6 + 8 + 7 + 9 = 6 + 9 + 8 + 7
= 15 + 15
= 30

5 x 8 x 2 = 2 x 5 x 8
= 10 x 8
= 80

a) 2 x 9 x 5 = ?
b) 7 x 8 x 10 = ?
c) 7 + 6 + 3 + 4 = ?
d) 13 + 15 + 5 + 7 = ?
e) 24 + 31 + 16 + 9 = ?
f) 42 + 14 + 6 + 18 = ?
g) 14 + 15 + 15 + 16 = ?
h) 13 x 10 x 2 = ?

3. Using the distributive property, solve the following problems for n, p, y, z. Study the following examples:

eg.

$$\underbrace{35 \times 7}$$
$$\underbrace{\underbrace{30\ (7)}_{210} + \underbrace{5\ (7)}_{35}}_{245}$$

$$\underbrace{48 \times 5}$$
$$\underbrace{\underbrace{n\ (5)}_{p} + \underbrace{8\ (5)}_{y}}_{z}$$

$$\underbrace{48 \times 5}$$
$$\underbrace{\underbrace{40\ (5)}_{200} + \underbrace{8\ (5)}_{40}}_{240}$$

n = 40, p = 200, y = 40, z = 240

a)
$$\underbrace{15 \times 5}$$
$$\underbrace{5\ (5)}_{p} + \underbrace{n\ (5)}_{y}$$
$$\underbrace{p + y}_{z}$$

b)
$$\underbrace{17 \times 8}$$
$$\underbrace{10\ (8)}_{p} + \underbrace{n\ (8)}_{y}$$
$$\underbrace{p + y}_{z}$$

c)
$$\underbrace{26 \times 3}$$
$$\underbrace{n\ (3)}_{p} + \underbrace{20\ (3)}_{y}$$
$$\underbrace{p + y}_{z}$$

d)
$$\underbrace{9 \times 25}$$
$$\underbrace{4\ (25)}_{p} + \underbrace{n\ (25)}_{y}$$
$$\underbrace{p + y}_{z}$$

4. Evaluate the following expressions. Use the distributive property to assist you.

eg. 7 x 13 = 7 (10 + 3)
= (7 x 10) + (7 x 3)
= 70 + 21
= 91

a) 43 x 9 = ?
b) 59 x 8 = ?
c) 69 x 5 = ?
d) 48 x 4 = ?
e) 56 x 12 = ?
f) 42 x 13 = ?
g) 66 x 22 = ?
h) 402 x 13 = ?
i) 526 x 14 = ?

5. Without calculating, state whether the following are true or false.

a) (17 x 395) + (14 x 395) = (17 + 14) x 395
b) (14 x 963) + (6 x 963) = 20 x 963
c) (5 x 7) + (3 x 3) = 8 x 10
d) (11 x 53) + (1 x 53) = 12 x 53
e) (17 x 97) + 97 = 18 x 97
f) (27 x 351) + 351 = 28 x 351
g) (16 x 5) + (4 x 5) = 20 x 10
h) (14 x 7) + 14 = 28 x 7

6. Using the properties you have learned, calculate the following as quickley as possible.

a) 19 + 8 + 12 + 1 = ?
b) 5 x 7 x 9 x 2 = ?
c) 4 x 7 x 25 = ?
d) 5 x 8 x 2 x 2 x 5 = ?
e) 13 + 8 + 6 + 2 + 4 = ?
f) 16 x 4 x 5 = ?
g) 9 + 6 + 2 + 4 + 8 = ?
h) 58 + 41 + 19 + 12 = ?
i) 5 x 7 x 4 x 9 = ?
j) 5 + 23 + 17 + 41 =?
k) 5 x 4 x 7 x 2 x 5 = ?
l) 14 + 23 + 16 + 7 = ?
m) 251 + 64 + 9 + 36 = ?
n) 9 x 2 x 3 x 5 = ?
o) 6 x 3 x 5 x 4 = ?
p) 4 x 5 x 89 x 5 = ?
q) 21 + 6 + 9 + 11 = ?
r) 12 + 8 + 4 + 2 + 3 = ?
s) 9 x 2 x 5 x 4 = ?
t) 54 + 9 + 6 + 21 = ?
u) 6 x 2 x 3 x 5 x 2 = ?
v) 25 x 5 x 8 = ?
w) 51 + 64 + 16 + 9 + 35 = ?

IF YOU TOOK: 2 minutes- genius
3 minutes- wizard
4 minutes- super
5 minutes- bright
6 minutes- more practice.

Evaluation

When more than one operation occurs in an expression follow the following rule:

B - Brackets

O - Of (means multiply when used with fractions)

D } Division / M } Multiplication } in the order that they appear from left to right

A } Addition / S } Subtraction } in the order that they appear from left to right

eg. 1.
4 + 5 x 6
= 4 + 30
= 34

eg. 2.
132 - (22 + 18)
= 132 - 40
= 92

eg. 3.
(24 + 6) ÷ 5 + 8 x 3
= 30 ÷ 5 + 8 x 3
= 6 + 8 x 3
= 6 + 24
= 30

I. Evaluate each of the following number sentences by following the rules for order of operations. Complete the sentence below using the number letter key provided.

1) 4 - 2 x 2 = ?
2) 6 + 3 ÷ 3 = ?
3) 7 x 6 - 3 = ?
4) 8 ÷ 4 - 1 = ?
5) 20 - 5 x 2 = ?
6) 18 - 8 ÷ 2 = ?
7) 3 + 5 x 4 = ?
8) 9 - 9 ÷ 3 = ?
9) 14 + 4 ÷ 2 = ?
10) 9 - 8 ÷ 4 = ?
11) 5 x 4 + 19 = ?

WHAT DID ONE MATH STUDENT SAY TO ANOTHER?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10	11

Number-Letter Key

A = 7
E = 16
G = 23
H = 1
I = 10
M = 0
R = 6
S = 14
T = 39

II. Evaluate each of the number sentences below, following the rules for order of operation. Use the number-letter key to complete the sentence on the following page.

1) 7 + 9 - 4 x 2 = ?
2) 18 ÷ 3 + 7 - 8 = ?
3) 6 x 4 ÷ 8 + 9 = ?
4) 24 - 3 x 4 ÷ 12 = ?
5) 27 ÷ 9 + 3 x 7 = ?
6) 13 + 9 - 24 ÷ 3 = ?
7) 7 x 6 + 27 ÷ 3 = ?
8) 3 + 8 x 6 ÷ 12 = ?
9) 25 + 15 ÷ 5 x 6 = ?
10) 12 ÷ 4 x 2 - 6 = ?
11) 17 - 9 + 7 x 4 = ?
12) 4 x 6 - 21 ÷ 3 = ?
13) 5 + 4 x 2 = ?

Number-Letter Key

A = 7
B = 23
E = 24 or 0
F = 36
M = 12
N = 8 or 13
R = 14 or 43
S = 51
U = 5 or 17

WHAT DID ONE BOOKKEEPER SAY TO ANOTHER BOOKKEEPER?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10	11	12	13

III. Evaluate each of the following number sentences below. Discover the sentences below by using the number letter key provided.

1) 7 + 11 - 9 x 6 ÷ 3 = ?
2) 14 - 6 x 3 ÷ 9 + 5 = ?
3) 7 x 4 ÷ 2 + 7 - 9 = ?
4) 36 ÷ 4 + 6 - 3 x 4 = ?
5) 5 x 7 + 21 ÷ 7 - 9 = ?
6) 5 + 4 x 8 - 18 ÷ 3 = ?
7) 40 - 9 ÷ 3 x 7 + 5 = ?
8) 48 ÷ 16 x 7 + 13 - 18 = ?
9) 18 + 14 ÷ 2 - 3 x 4 = ?
10) 23 - 51 ÷ 3 + 7 x 8 = ?
11) 6 x 9 - 63 ÷ 9 + 5 = ?
12) 72 ÷ 9 - 8 + 7 x 7 = ?
13) 4 + 8 ÷ 2 x 11 = ?
14) 9 + 18 ÷ 9 - 3 = ?
15) 12 - 4 ÷ 2 + 1 = ?
16) 10 - 8 x 3 ÷ 3 = ?
17) 13 + 2 x 10 + 5 = ?

WHAT DID ONE DOCTOR SAY TO ANOTHER DOCTOR?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Number-Letter Key

A = 29, 52, or 11
E = 12, 48, or 8
I = 24
N = 13

O = 16 or 0
P = 17
R = 3 or 49
S = 62 or 2

T = 31
Y = 38

IV. Evaluate each of the number sentences below, following rules pertaining to grouping symbols and order of operations. Discover the sentence that follows using the number key provided.

1) 15 ÷ (12 ÷ 2 - 1) = ?
2) (8 + 4) ÷ (24 ÷ 8) = ?
3) (16 - 8) x 4 - 20 = ?
4) (5 + 9) ÷ 7 + 5 = ?
5) (2 + 10) ÷ (6 - 4) = ?
6) [21 ÷ (10 - 3)] ÷ 3 = ?
7) (7 x 4 + 4) ÷ 4 = ?
8) [(19 - 4) x 2] ÷ 6 = ?
9) (24 ÷ 4 + 6) + 3 = ?
10) [(27 - 6) ÷ 3] x 7 = ?
11) [(12 + 3) ÷ 5] x 9 = ?
12) [(67 - 4) ÷ 9] x 6 = ?

Number-Letter Key

D = 8
I = 7, 5, 49
S = 42

E = 4, 1
K = 6
T = 27

G = 15
L = 12
W = 3

WHAT DID THE FINGERS SAY TO THE TOES?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10	11	12

REVIEW EXERCISES: Review OBJECTIVE NO'S 1-11

1. Write the following whole numbers in expanded form:

a) 231
b) 4 295
c) 9 001
d) 1 040
e) 99 840 049
f) 80 000
g) 421
h) 98
i) 3 421
j) 90 042

2. Write the following in standard form:

a) (9 x 10 x 10 x 10 x 10)+(8 x 10 x 10 x 10)+(0 x 10 x 10)+(1 x 10) +(0 x 1)
b) (1 x 1 000 000)+(0 x 100 000)+(0 x 10 000)+(2 x 1 000)+(1 x 100) +(0 x 10)+(1 x 1)
c) (1 x 10)+(2 x 1)
d) (4 x 1)
e) (5 x 10 x 10 x 10)+(0 x 10)+(2 x 1)
f) (9 x 10)+(8 x 1)
g) (3 x 10 000 000)+(2 x 1 000 000)+(9 x 100 000)+(0 x 10 000) +(0 x 1 000)+(2 x 100)+(5 x 10)+(5 x 1)
h) (4 x 10 x 10)+(5 x 10)+(4 x 1)
i) (3 x 10 x 10 x 10)+(0 x 10 x 10)+(1 x 10)+(6 x 1)
j) (4 x 10 x 10 x 10 x 10 x 10 x 10)+(3 x 10 x 10 x 10 x 10 x 10) +(9 x 10 x 10 x 10 x 10)+(7 x 10 x 10 x 10)+(0 x 10 x 10)+(1 x 10)+(2 x 1)

3. Perform the following subtractions:

a) $\begin{array}{r}984\\ \underline{-29}\end{array}$ b) $\begin{array}{r}243\\ \underline{-81}\end{array}$ c) $\begin{array}{r}49\\ \underline{-0}\end{array}$ d) $\begin{array}{r}489\\ \underline{-21}\end{array}$ e) $\begin{array}{r}4001\\ \underline{-984}\end{array}$

f) $\begin{array}{r}99812\\ \underline{-9994}\end{array}$ g) $\begin{array}{r}34\\ \underline{-31}\end{array}$ h) $\begin{array}{r}49001\\ \underline{-9885}\end{array}$ i) $\begin{array}{r}56241\\ \underline{-8492}\end{array}$ j) $\begin{array}{r}981\\ \underline{-92}\end{array}$

4. Add the following:

a) $\begin{array}{r}432\\ 92\\ \underline{1284}\end{array}$ b) $\begin{array}{r}891\\ \underline{0}\end{array}$ c) $\begin{array}{r}9813\\ 946\\ 361\\ \underline{98192}\end{array}$ d) $\begin{array}{r}45\\ 29\\ 131\\ \underline{1349}\end{array}$ e) $\begin{array}{r}99\\ 881\\ 36\\ \underline{984}\end{array}$

f) $\begin{array}{r}1498431\\ \underline{936494}\end{array}$ g) $\begin{array}{r}9832\\ \underline{761}\end{array}$

h) 45 + 91 + 321 + 983 + 18 = ?
i) 94 + 89 + 453 + 9812 + 2 = ?
j) 45 + 911 + 3391 + 482 = ?

5. Multiply the following whole numbers:

a) $\begin{array}{r} 983 \\ \underline{\times 13} \end{array}$ b) $\begin{array}{r} 43 \\ \underline{\times 2} \end{array}$ c) $\begin{array}{r} 19 \\ \underline{\times 21} \end{array}$ d) $\begin{array}{r} 92 \\ \underline{\times 421} \end{array}$ e) $\begin{array}{r} 4012 \\ \underline{\times 981} \end{array}$

f) $\begin{array}{r} 81 \\ \underline{\times 399} \end{array}$ g) $\begin{array}{r} 4841 \\ \underline{\times 119} \end{array}$ h) $\begin{array}{r} 42 \\ \underline{\times 894} \end{array}$

6. Divide the following whole numbers:

a) 810 ÷ 9 = b) 408 ÷ 8 = c) $79\overline{)67229}$ d) $43\overline{)31261}$

e) $981\overline{)30411}$ f) $88\overline{)41086}$ g) $912\overline{)4396752}$ h) $93\overline{)372186}$

7. Perform the following operations using short cuts to make computation easier:

a) 4 x 9 x 25
b) 49 + 13 + 1 + 7
c) 20 x 19 x 5
d) 5 x 14 x 2
e) 17 + 21 + 9 + 13
f) 15 x 17 x 2
g) 5 + 19 + 15 + 21
h) 49 + 57 + 13 + 11
i) 25 x 94 x 4 x 10
j) 491 + 18 + 9 + 2

8. Label the parts of the following operations:

$$\begin{array}{r} 49 \\ \underline{+3} \\ 52 \end{array}$$

a) ________
b) ________

$$\begin{array}{r} 982 \\ \underline{-41} \\ 941 \end{array}$$

c) ________
d) ________
e) ________

f) ________

$$\begin{array}{r} 163 \\ 3\overline{)491} \\ \underline{3} \\ 19 \\ \underline{18} \\ 11 \\ \underline{9} \\ 2 \end{array}$$

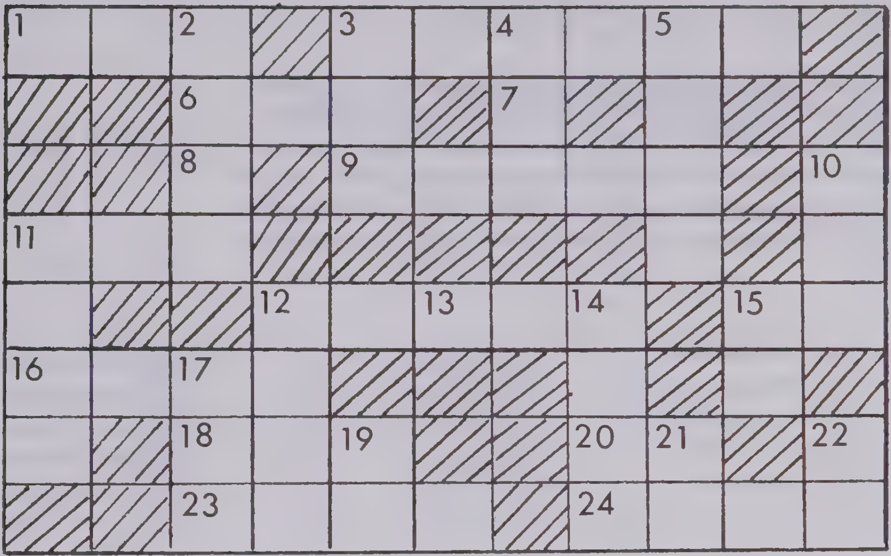
g) ________
h) ________
i) ________

$$\begin{array}{r} 45 \\ \underline{\times 2} \\ 90 \end{array}$$

j) ________
k) ________
l) ________

9. Evaluate the following pairs of expressions, then put the correct symbol between them (<, > , =)

a) 45 ÷ 3 + 6 ______ 45 ÷ (3 + 6)
b) 15 - 4 x 3 + 2 ______ 15 - (4 x 3) + 2
c) 5 + 6 - 3 ÷ 3 ______ 60 ÷ 6 - 5
d) 18 ÷ 3 - 2 x 2 ______ 21 ÷ 7 - 4 ÷ 2



ACROSS

1. 16 x 8
3. 714 x 280
6. 140 + 131 + 56 + 137 + 92
7. 2 700 ÷ 300
8. 36 ÷ (3 x 3) + 4
9. 889 x 44
11. 8 x 9 - 15 ÷ 5 + 100
12. 628 x 43
15. 10 + 3 x 14 - 6 + 10
16. 945 + 268
18. 3 + 20 x 20 + 14
20. 23 + 15 - 9 x 3
23. 516 x 9
24. 765 x 7

DOWN

2. 60 123 ÷ 7
3. 489 ÷ 3
4. 855 + 136
5. 478 x 6
10. (45 + 5 - 11) x (9 x 3 - 3)
11. 214 x 8
12. 873 + 528 + 915
13. 39 ÷ (10 + 3) - 3
14. 863 x 5
15. 6 + 43 + 7
17. 12 x 12
19. 49 + 8 ÷ 8 + 49 - 25
21. 91 ÷ 7
22. 28 ÷ 4 + 3 x 8 - 6

EXERCISES:

1. Copy and complete these tables of values.

Example: Replacement set {1,2,3,4}

REPLACEMENTS

n	2 n + 1		
	SUBSTITUTION	COMPUTATION	VALUE
1	2 (1) + 1	2 + 1	3
2			
3			
4			

a)

n	3 n + 1
1	
2	
3	
4	
5	

b)

n	2 n
2	
3	
4	
5	
7	

c)

n	5 n - 2
5	
8	
9	
6	
7	

d)

n	5 x 2 n
7	
5	
6	
3	
2	

e)

n	11 - n
1	
2	
5	
4	
9	

f)

n	n x 7
2	
6	
3	
9	
7	

2. Evaluate the following for the values of the variable given.

a) n + n + n when the replacement set is {0, 1, 2, 3, 4}.

b) 4 x a when the replacement set is {0, 1, 2, 3, 4}.

c) 12 ÷ n when the replacement set is {2, 4, 6}.

d) c + c + c + c + c when the replacement set is {1, 3, 5, 7}.

e) 5 x n when the replacement set is {1, 2, 3,}.

f) 3a when the replacement set is {2, 4, 6, 8}.

g) 6f when the replacement set is {2, 4, 6, 8}.

h) a + 2a when the replacement set is {1, 2, 3, 4}.

i) 2a + 3a when the replacement set is {0, 1, 2, 3,}.

j) 2a + 2a + 2a when the replacement set is {2, 4, 6}.

EXERCISES:

1. Solve these conditions:

Cover the variable with your thumb. Ask yourself, "What number must be under my thumb in order that the statement be true?"

a) $n + 7 = 17$
b) $n - 9 = 8$
c) $n - 5 = 6$
d) $n + 3 = 8$
e) $n + 12 = 19$
f) $n - 5 = 9$
g) $x - 3 = 16$
h) $x + 3 = 37$
i) $x - 1 = 12$
j) $x + 1 = 11$
k) $n - 6 = 17$
l) $n + 3 = 15$
m) $n - 8 = 15$
n) $n - 6 = 7$
o) $n + 20 = 39$
p) $a + 7 = 9$
q) $x + 9 = 17$
r) $x - 7 = 11$
s) $x + 23 = 67$
t) $x - 59 = 93$

2. Solve these conditions.

a) $6n = 30$
b) $2n = 8$
c) $4n = 28$
d) $\frac{n}{5} = 11$
e) $8n = 56$
f) $\frac{x}{3} = 8$
g) $15x = 60$
h) $24x = 96$
i) $6x = 96$
j) $3x = 51$
k) $n \div 6 = 12$
l) $n \div 2 = 9$
m) $11n = 77$
n) $\frac{n}{9} = 7$
o) $\frac{n}{7} = 7$
p) $27x = 81$
q) $x \div 7 = 13$
r) $\frac{x}{8} = 12$
s) $\frac{x}{9} = 8$
t) $\frac{x}{5} = 24$

To answer the riddles which follow, solve each condition (equation) for the variable. Then place the variable in the space which corresponds to its value. (The first one has been done for you.)

1. *WHAT DO THEY CALL A SMART DUCK IN SCHOOL?*

$\overline{\ 7\ }\ \overset{w}{\overline{\ 2\ }}\ \overline{\ 4\ }\ \overline{20}\ \overline{\ 6\ }\qquad \overline{\ 8\ }\ \overline{\ 3\ }\ \overline{\ 7\ }\ \overline{13}\ \overline{14}\ \overline{\ 6\ }\ \overline{15}$

eg. $w + 3 = 5$ $w = 2$

$a + 5 = 12$
$9 + q = 17$
$e + 9 = 15$

$s - 17 = 3$
$9 + u = 12$
$i - o = 4$

$k - 5 = 9$
$c - 12 = 1$
$r - 9 = 6$

2. *WHY DO DRAGONS SLEEP IN THE DAYTIME?*

$\overline{18}\ \overline{\ 2\ }\ \overline{\ 3\ }\ \overline{27}\ \overline{\ 1\ }\ \overline{\ 8\ }\ \overline{\ 2\ }\qquad \overline{\ 4\ }\ \overline{\ 7\ }\ \overline{\ 2\ }\ \overline{13}$

$\overline{\ 3\ }\ \overline{27}\ \overline{\ 6\ }\qquad \overline{\ 7\ }\ \overline{\ 1\ }\ \overline{\ 6\ }\ \overline{\ 4\ }\qquad \overline{11}\ \overline{\ 6\ }\ \overline{10}\ \overline{\ 5\ }\ \overline{\ 7\ }\ \overline{\ 4\ }\ \overline{\ 8\ }$

$3g = 15$
$h \times 6 = 42$
$9\ t = 36$
$15c = 45$

$2y = 26$
$a \div 9 = 3$
$n \div 6 = 1$
$19 \times u = 19$

$s \div 1 = 8$
$16 = e \times 8$
$3k = 33$
$i \div 5 = 2$
$b \div 2 = 9$

3. *WHY IS YOUR NOSE IN THE MIDDLE OF YOUR FACE?*

$\overline{\ 5\ }\ \overline{\ 3\ }\ \overline{\ 6\ }\ \overline{\ 2\ }\ \overline{\ 7\ }\ \overline{\ 4\ }\ \overline{\ 3\ }\qquad \overline{21}\ \overline{15}\qquad \overline{21}\ \overline{\ 4\ }\qquad \overline{\ 2\ }$

$\overline{\ 4\ }\ \overline{\ 6\ }\ \overline{\ 3\ }\ \overline{\ 9\ }\ \overline{15}\ \overline{\ 3\ }\ \overline{13}$

$s + 17 = 21$
$12e = 36$
$5a + 6 = 16$

$t \div 5 = 3$
$18 + c = 24$
$3b + 1 = 16$

$27 - u = 20$
$2i = 42$
$23 + n = 32$
$3r = 39$

EXERCISES:

Verification

OBJECTIVE NO. 14

Find a replacement for the variable. Verify by substituting the solution for the variable. The first one has been done for you.

CONDITION	SOLUTION	VERIFICATION
1. $2 + x = 5$	$x = 3$	$2 + (3) = 5$ $5 = 5$
2. $y + 3 = 7$		
3. $z - 2 = 5$		
4. $r - 6 = 2$		
5. $3r = 12$		
6. $5x = 20$		
7. $4\ \mathrm{x}\ z = 28$		
8. $2y + 4 = 10$		
9. $2x + x = 9$		
10. $4x + 5 = 17$		
11. $3p + 7 = 16$		
12. $6x = 12$		
13. $2y = 60$		
14. $z \div 7 = 12$		
15. $2n + 3n = 15$		

EXERCISES: Fun With Conditions OBJECTIVE NO. 15

1. Solve these conditions.

a) $n + 17 = 173$
$n = 173 - 17$

$n = 156$

b) $n - 23 = 48$
$n = 48 + 23$

$n = 71$

c) $n - 15 = 37$
d) $n + 26 = 54$
e) $n + 12 = 91$
f) $n - 9 = 28$
g) $x - 47 = 83$
h) $n - 166 = 24$
i) $13 + n = 59$
j) $35 + n = 223$
k) $x - 341 = 29$
l) $a + 48 = 97$
m) $23 + n = 108$
n) $x - 52 = 17$
o) $b + 18 = 61$
p) $a - 30 = 24$
q) $x - 92 = 11$

2. Solve these conditions.

a) $6n = 78$
$n = 78 \div 6$

$n = 13$

b) $n \div 14 = 9$
$n = 9 \times 14$

$n = 126$

c) $13n = 169$
d) $21n = 126$
e) $17x = 204$
f) $7x = 91$
g) $a \div 17 = 6$
h) $x \div 8 = 22$
i) $47a = 188$
j) $n \div 37 = 18$
k) $53x = 583$
l) $a \times 19 = 133$
m) $8n = 120$
n) $x \times 27 = 216$

3. Solve the following conditions.

a) $2x + 4 = 20$
$x = (20 - 4) \div 2$

$x = 8$

b) $5a - 4 = 21$
$a = (21 + 4) \div 5$

$a = 5$

c) $3n + 2 = 11$
d) $4x - 3 = 17$
e) $7a + 13 = 76$
f) $14x - 38 = 116$
g) $15x + 20 = 95$
h) $7z - 22 = 27$
i) $9x + 14 = 95$
j) $12n - 11 = 133$
k) $4n + 8 = 36$
l) $25x + 14 = 139$
m) $20a - 7 = 73$
n) $6x - 25 = 29$

4. Solve these conditions.

a) $3a + a = 24$
$4a = 24$
$a = 24 \div 4$

$a = 6$

b) $4x + 3x = 56$
$7x = 56$
$x = 56 \div 7$

$x = 8$

c) $9x + 7x = 128$
d) $15a - 9a = 90$
e) $38x - 7x = 93$
f) $5n + 17n = 242$
g) $22a - 15a = 98$
h) $13x + 29x = 336$
i) $8n + 17n = 200$
j) $105x - 75x = 120$

EXERCISES:

Translations

OBJECTIVE NO. 16

1. Write English phrases for the following mathematical expressions:
Example: 1. $x + 7$ A number increased by seven.
2. $7 - x$ Seven diminished by a number.

a) $x + 2$
b) $3x$
c) $x - 5$
d) $6 - x$
e) $2x + 1$
f) $3x - 2$
g) $4x + 6$
h) $6 + 3x$
i) $2 + x + 2x$
j) $17 - 2x$

2. Write English sentences for the following mathematical **sentences:**
Example: $x + 3 = 8$ A number increased by 3 is equal to 8.

a) $x - 2 = 7$
b) $5x = 15$
c) $3x = 18$
d) $3x - 5 = 13$
e) $4x = x + 15$
f) $23 = x - 10$
g) $5 + x = 18$
h) $17 - x = 9$
i) $10 + x = 12$
j) $14 = 20 - 2x$

3. Make up a problem to match each of these conditions:
Example: $x + 7 = 15$ Paul had some hockey cards. He collected 7 more and then he had 15 cards. How many cards did he start with?

a) $2x = 10$
b) $17 - x = 12$
c) $x + 13 = 25$
d) $2x + 4 = 16$
e) $3x - 5 = 22$
f) $4x = 24$

4. *WHERE DOES A 400 kg CANARY SIT?*
To solve the riddle match the English phrases with the correct mathematical expressions; transfer the letter to the numbers below.

ENGLISH PHRASE

1. A number decreased by six
2. A certain number doubled
3. Eight is increased by a number
4. Twelve more than a number
5. An unknown number is added to 17
6. An unknown number is subtracted from 5
7. A number increased by 3
8. 6 added to a number
9. The product of seven and a number
10. Eight is increased by twice a number
11. A number tripled
12. Five is subtracted from an unknown number
13. The sum of a certain number and fourteen
14. A certain number multiplied by five
15. Three times a number diminished by two

EXPRESSION

A	$x - 6$
E	$5 - x$
E	$5x$
E	$8 + 2x$
E	$x + 6$
H	$17 + x$
H	$7x$
I	$x - 5$
K	$x + 14$
L	$3x$
N	$2x$
R	$x + 3$
S	$3x - 2$
W	$x + 12$
Y	$8 + x$

A
___ 1 ___ 2 ___ 3 ___ 4 ___ 5 ___ 6 ___ 7 ___ 8 ___ 9 ___ 10

___ 11 ___ 12 ___ 13 ___ 14 ___ 15

1. Write the mathematical sentences for the following:
DO NOT SOLVE.
Example: A number diminished by seven is equal to five.
$x - 7 = 5$

a) The sum of five and nine is fourteen.

b) The product of five and four is twenty.

c) The quotient of nine and three is three.

d) If you multiply a number by five, the result is 35.

e) If you add 6 to a number, the result is 13.

f) If you subtract 7 from a number, the result is 9.

g) If you multiply a number by 11, you get 121.

h) A number divided by 9 is equal to 21.

i) If you add 17 to a number, the sum is 35.

j) If you add 15 to a number, the result is 34.

k) A number divided by 7 is equal to 12.

l) If you subtract 307 from a number, the result is 814.

m) The product of a number and 7 is the same as 21.

n) If you decrease a number by 5, the result is 6.

o) A number divided by 6 equals 9.

2. Write mathematical sentences for the following:
DO NOT SOLVE.
Example: The sum of an unknown and 6 is 24.

$x + 6 = 24$

a) A number less 12 is 15.

b) 14 increased by a number results in 24.

c) A number diminished by 13 is 21.

d) 22 greater than a number will be 33.

e) Twice a number is 12.

f) A number is 6 larger than 10.

g) The sum of 14 and 3 is a number.

h) A number tripled yields 27.

i) The difference between 24 and 11 is a number.

j) 6 less than a number is 4.

k) 14 is 6 smaller than a certain number.

l) 4 times a number less 6 is 26.

m) 6 more than a number is 29.

n) 5 more than 3 times a number results in 20.

o) 4 more than a number results in 6 less than 3 times the number.

3. Write conditions for each of the following problems.
   Let "x" represent the unknown. DO NOT SOLVE.

   Example: Jason had 33 pieces of gum. After he gave some away, he had 19 left. How many did he give away?

   $33 - x = 19$

   a) 232 grade 7 students at Balwin Junior High were divided up into 8 equal classes. How many students would be in each class?

   b) Wendy bought a skirt for 19 dollars. She then had 17 dollars left. How many dollars did she have before she bought the skirt?

   c) Mr. Auto's car averages 8 km/ℓ of gasoline. If the tank holds 72 litres, how far can he drive on one tankful of fuel?

   d) Mr. Chips has a board 50 dm long. If he cuts 4 pieces each 9 dm long, how much board is left?

   e) A number plus three times the number is 28. What is the number?

   f) The sum of two numbers is 4963. One number is 1947. Find the other number.

   g) The quotient of two numbers is 19. The smaller number is 25. What is the larger number?

   h) Jim gets an allowance of 75¢ per week. If he saves his allowance for six weeks and then purchases a pocket knife worth $3.98, how much does he have left?

EXERCISES: (CONT'D) 30 Days Has September OBJECTIVE NO. 17

4. *WHICH MONTH HAS 28 DAYS?*

To answer the puzzle, match the English sentence with the condition; transfer the letter to the numbers below.

1.	A number increased by seven is equal to 13.	A.	$20 = 3x + 5$
2.	Five more than a number is 24.	A.	$x - 9 = 12$
3.	A number plus 8 is equal to 19.	E.	$x + 8 = 19$
4.	If a number is doubled, the result is 20.	E.	$2x + 3 = 19$
5.	Twenty is 5 more than three times a number.	H.	$x + 5 = 24$
6.	When a certain number is subtracted from 11, the result is 8.	H.	$x + 2x = 15$
7.	Four times an unknown number is 28.	L.	$4x = 28$
8.	A number plus twice the number is 15.	L.	$11 - x = 8$
9.	A number diminished by 9 is 12.	T.	$x + 7 = 13$
10.	Three times a number increased by 2 is 14.	V.	$3x + 2 = 14$
11.	A number doubled, plus three is equal to 19.	Y.	$2x = 20$

___ ___ ___ ___   ___ ___ ___   ___ ___ ___ ___
1 2 3 4   5 6 7   8 9 10 11

We Got Problems!

A. Solve the following problems:

SHOW ALL THE STEPS
(1) *VARIABLES:* Let x = ________
(2) *CONDITION:*
(3) *SOLUTION:* x = ________
(4) *ANSWER:* A Statement

Example: Mr. James bought 16 sheets of plywood. He paid $8.45 a sheet. How much did the plywood cost him?

(1) Let x = the total cost of the plywood
(2) x = 16 (8.45)
(3) x = 135.20
(4) The plywood cost him $135.20

1. Mark had 31 chocolate bars. After he gave some away, he had 18 left. How many did he give away?

2. Mike had 15 Batman comic books. He had 24 after he bought some more. How many more did he buy?

3. John bought a bicycle from his savings. He paid $45.00 for the bicycle and had $9.00 left. How much money had John saved?

4. Mr. Olson has 115 tomato plants to set out. After one hour, he had set out 76. How many plants did he have left to set out?

5. Sue had 20 quarters. After she spent some of them she had 12 quarters left. How many quarters did Sue spend?

6. Joe has 14 more dimes than nickels. He has 45 nickels. How many dimes does he have?

7. Mutt drinks 3 times as much milk as his brother Jeff. Together they drink 24 glasses in a week. How many glasses do they each drink per week?

8. A school wants to buy some baseball bats. If they decided to buy 3 bats for $ 8.85, how much did they pay for each bat?

9. Roast beef costs $2.87 a kg, minced steak costs $1.49 a kg and turkey costs $.99 a kg. How much would you spend if you bought a 3 kg roast of beef, 2 kg of minced steak and a 11 kg turkey?

10. The population of a city was 67 209. The population was made up of 22 914 men, 9 016 boys, 23 785 women and a number of girls. How many girls were there in the city?

11. The Montrose basketball team bought 8 basketballs at \$14.85 each. How much did they pay for the basketballs?

12. Sirloin roasts cost \$3.85 a kg and pork chops \$2.78 a kg. Mrs. Brown bought a 3 kg roast and 2 kg of chops. How much change did she get back from a \$20. bill?

13. Jim bought a bicycle out of his savings. He paid \$79.95 for the bicycle and had \$133.42 left in his savings. How much did he have in savings before his purchase?

14. Janet had 876 stamps in her collection. After saving for another six months she had 1 073 stamps in her collection. How many more did Janet save during that time?

15. Mrs. Allen bought 6 cans of soup at 47¢ a can, 2 kg of oranges at \$1.13 a kg, 5 grapefruit at 19¢ each, and 3 kg of hamburger at \$1.19 a kg. What did she pay for her purchases?

16. During his Olympic training program, George ran a certain number of laps every day for a week. He ran 12 laps on Monday, 16 on Tuesday, 13 on Wednesday, 15 on Friday, 18 on Saturday, and 17 on Sunday. He ran a total of 108 laps during the week. How many laps did he run on Thursday?

17. Mr. Jones bought 38 litres of gasoline at 14¢ per litre. What was the cost of the gasoline?

18. On a recent trip Mr. Brown averaged 6 km to a litre of gasoline. If he used 36 litres of gasoline, how far did he drive?

19. Mrs. Dorsey bought 3 kg of apples at 39¢ a kg and some bananas at 33¢ a kg. If she spent \$1.83 in all how many kilograms of bananas did she buy?

20. On Tuesday Jack delivered 17 more papers than he had on Monday. His total delivery for the two days was 103. How many papers did he deliver on Tuesday?

B. ABSTRACT PROBLEMS:

Example: If you multiply a number by 7, then add 17 to the product, the result is 115. What is the number?

(1) Let x = the number
(2) 7 x x + 17 = 115
(3) x = 14
(4) The number is 14.

1. A number less 23 is equal to 85. What is the number?

2. Fourteen times a certain number is equal to 896. What is the number?

3. Three times a number diminished by 5 is equal to 88. What is the number?

4. Twice a certain number diminished by 47 is equal to 23. What is the number?

5. The product of a certain number and 12 is increased by 27. The result is 63. What is the number?

6. If you multiply a number by 6, then add 20 to the product, you will get 110. What is the number?

7. If you divide a number by 4, then subtract 5 from the quotient, you will get 8. What is the number?

8. The product of 12 and 13 increased by 17 equals a number. Find the number.

9. A number divided by 3 is 4 less than 12.

10. Twice a number decreased by 21 is 15.

11. Three times a number diminished by 7 equals 26.

12. If you increase 4 times a number by 76, the result is 664. What is the number?

REVIEW EXERCISES: **Review** OBJECTIVE NO'S 11 - 18

1. Solve for x:

   (a) $3x + 1 = 4$
   (b) $5x + 2x = 28$

2. Make these sentences true:

   (a) $9 - 5 = 6 - ?$
   (b) $3 \times 7 = 20 +$

3. Find the value of the following:

   (a) $3x + 2x + 1$ if $x = 4$
   (b) $\frac{(w \times 3) + 30}{w\ (w - 4)}$ if $w = 6$

4. (a) $532 - 329 + 27 = ?$

5. Insert <, > or = to make a true statement
   (a) $4 + 7 - (2 \times 3)\ ?\ (10 - 5)\ 5 - 5$
   (b) $(6 + 8)\ \left(\frac{9}{3}\right) + 30\ ?\ (5 + 7) + 2 \times 3$
   (c) $3\ \left(\frac{15}{15}\right) \times 3 \times 3\ ?\ \frac{(60 - 6)}{2}$

6. Evaluate the following:

   (a) $4 + 3x - 2x + 4 + x$ if $x = 3$
   (b) $m + (n + n) - m + (n + n)$ if $m = 2$ and $n = 4$
   (c) $2x - 3 + y$ if $x = 5$ and $y = 7$

7. Solve for the variable in each case:

   (a) $5x = 115$
   (b) $3a - 2 = 17 - 1$
   (c) $5a + a = 30$

8. (a) $y + 8 = 14$
   (b) $x - 3 = 2$

9. (a) $3x - 2 = 10$

10. (a) $5x - 3 + x$ for $x = 4$
    (b) $\frac{3x + 14}{4}$ for $x = 2$

11. (a) $7 + x = 12$
    (b) $18 + x = 25$
    (c) $7x = 42$
    (d) $6x = 18$
    (e) $4x + 7 = 19$
    (f) $3x + 11 = 38$
    (g) $5x + 3x = 64$
    (h) $9x + 4x = 78$

12. Solve:

    (a) $x + 5 = 8$
    (b) $2x - 3 = 11$

13. Solve:

    (a) $11 + x = 24$
    (b) $x - 8 = 3$

14. Write mathematical expressions for the following:

    (a) Six more than a number
    (b) Four more than twice a number
    (c) Five times a number less eight
    (d) Nine times twice a number
    (e) Eight less than twice a number
    (f) Nine times a number less eight

15. Write mathematical sentences for the following:

    (a) Three times a number is equal to 27.
    (b) Six more than a number is equal to 31.
    (c) Five more than twice a number is equal to 120.
    (d) Four times a number less six is equal to 130.
    (e) Seven less than three times a number is equal to 32.
    (f) Fourteen less than three times a number is equal to 8.

16. Write conditions for these problems: DO NOT SOLVE.

    (a) If 16 is subtracted from three times a number, the result is 80.

    (b) The product of eight and twice a number is 144.

    (c) Sixty diminished by twice a number is 30.

    (d) The difference between twice a number and 16 is 42.

    (e) Jack is collecting hockey cards. In January he collected 52 cards, and twice as many in February. How many cards did he collect during the two months?

    (f) On his paper route Tom collects $19.50 during one week. If he collected $7.00 on Monday and $6.75 on Tuesday, how much more does he have to collect?

    (g) The population of Edmonton is approximately 450 000. How much more would the population have to increase by to reach 525 000?

    (h) During a football season the Calgary Stampeders scored a total of 384 points in 16 games. What was their average score per game?

17. Solve the problems:

    (a) Nancy has four dollars. She gets fifteen dollars as a birthday present. She then spends three dollars on each of her two brothers. How much money does she now have?

    (b) Tony purchases five articles at the same price and then spends four dollars on a record. Altogether he spends nineteen dollars. Find the cost of each article.

    (c) Betty has some records. When she buys five more she will have 3 times the amount that Susan has. Susan has 8 records. How many records does Betty have at present?

    (d) There are three times as many students in the Drama Club as there are in the Science Club. There are 92 students altogether in the two clubs. How many students are there in the Science Club?

★ ★

LEVEL 7

UNIT III

RATIONAL NUMBERS

UNIT III - RATIONAL NUMBERS

CONCEPT CHECK LIST

When you have completed this unit, you should be able to:

FACTORS AND MULTIPLES

1. Write all the factors of a number.
2. Write the prime factorization of a number.
3. List the required multiples of a number.

FRACTIONS

1. State what a fraction is.
2. Locate a fraction on a number line.
3. Write equivalent fractions.
4. Reduce fractions to basic form.
5. Order a set of fractions. ($<$, $>$, $=$)

DECIMALS

1. Use decimal notation.
2. Locate a decimal on a number line.
3. Write standard and expanded form of decimals.
4. Order a set of decimals. ($<$, $>$, $=$)
5. Round off decimals to required accuracy.

FRACTIONS AND DECIMALS

1. Compute with fractions and decimals. (Add, subtract, multiply, divide.)
2. Apply the order of operations in computation.
3. Use zero properly in computation.
4. Convert fractions to decimals and decimals to fractions.
5. Use fractions and decimals in evaluating expressions by substitutions.
6. Solve conditions involving fractions and decimals.

   Types: $A + x = B$, $Ax = B$, $Ax + Bx = C$
7. Verify the solutions of conditions.

PROBLEM SOLVING

1. Translate English statements into mathematical expressions.
2. Write English statements for mathematical expressions.
3. Solve problems involving decimals and fractions.

1. (a) List 5 multiples of 3.
   (b) List 5 multiples of 7.
   (c) List 5 multiples of 2.
   (d) Find and list ten numbers which are multiples of both 2 and 5.
   (e) Find and list ten numbers which are multiples of both 2 and 3.

2. Write each of the following as a product of two factors. Try to factor in two ways.
   e.g. 36 = 6 x 6 or 36 = 9 x 4
   (a) 14 (b) 24 (c) 8 (d) 15
   (e) 21 (f) 35 (g) 45 (h) 96

3. (a) Which of these numbers are divisible by 2, 3, 4 or 5? (Do this by using the test for divisibility.)
   15, 36, 17, 45, 50, 91, 32, 196, 100

   (b) Which of these numbers are divisible by 6, 8, 10, or 11?
   6, 48, 20, 121, 143, 184, 102, 176, 2002, 33 000.

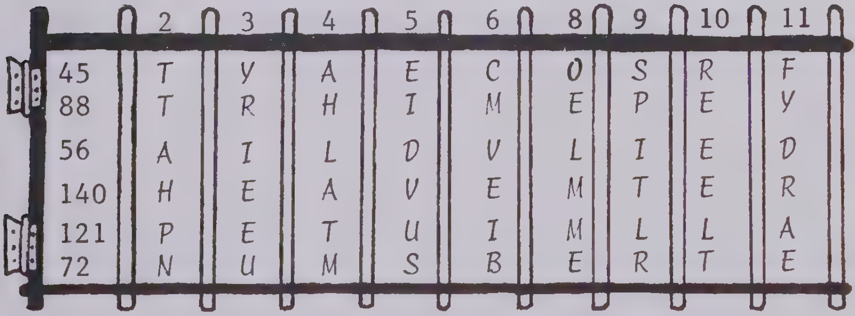
4. Identify each of the following numbers as prime or composite. List three factors of all composite numbers. Do not use one as a factor.
   e.g. 12, composite, 12, 6, 2
   7, prime
   (a) 6 (b) 19 (c) 918 (d) 121
   (e) 13 (f) 57 (g) 91 (h) 71

5. Which number is a factor of all numbers?

6. Using the tests of divisibility determine the factors of each of the numbers in the left hand column.

   a. Circle the letters in the appropriate columns to find the answer to the following question.

   CAN YOU TELEPHONE PRISONERS IN JAIL?



	2	3	4	5	6	8	9	10	11
45	T	Y	A	E	C	O	S	R	F
88	T	R	H	I	M	E	P	E	Y
56	A	I	L	D	V	L	I	E	D
140	H	E	A	V	E	M	T	E	R
121	P	E	T	U	I	M	L	L	A
72	N	U	M	S	B	E	R	T	E

   b. Unscramble the letters which were not circled in each line to answer the following questions.

   Line 1 - 6 is a ____________ of 96
   Line 2 - Two is the only even ______________
   Line 3 - Knowing these tests will help you ______________
   Line 4 - An SI unit of linear measure. ______________
   Line 5 - 14 is a __________ of 7 and 2
   Line 6 - A definite collection of objects __________

1. For each number, list the set of factors. Then write P if the number is prime, or C if it is composite.

   (a) 14 (b) 24 (c) 8 (d) 16
   (e) 4 (f) 5 (g) 10 (h) 3

2. For each number list the set of factors.

   (a) 6 (b) 15 (c) 18 (d) 12
   (e) 25 (f) 21 (g) 26 (h) 30
   (i) 245 (j) 360

3. Use the set of whole numbers between 20 and 31. List the factors of each number. Tell whether the number is prime or composite.

A factor is a whole number Which divides exactly into a Second whole number.

e.g. 36

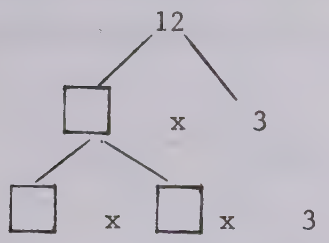
1 x 36
2 x 18
3 x 12
4 x 9
6 x 6

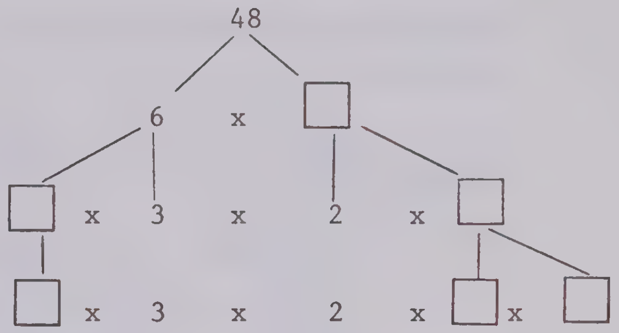
The factors of 36 are:
1, 2, 3, 4, 6, 9, 12, 18, 36

Stop when a factor reoccurs

1. Complete the following tree diagrams:

(a)





The prime factorization of 12 is ____________________

The prime factorization of 48 is ____________________

2. Using the tree diagram method, prime factorize the following numbers:

(a) 42 (b) 72 (c) 27 (d) 84

(e) 255

3. Complete the following by placing the correct number in the blanks provided:

(a)
2/ 56
2/ ____
___/ 14
___/ 7
1

(b)
___/ 126
3/ 63
3/ ____
___/ 7
1

(c)
___/ 441
___/ 147
___/ 21
___/ 7
1

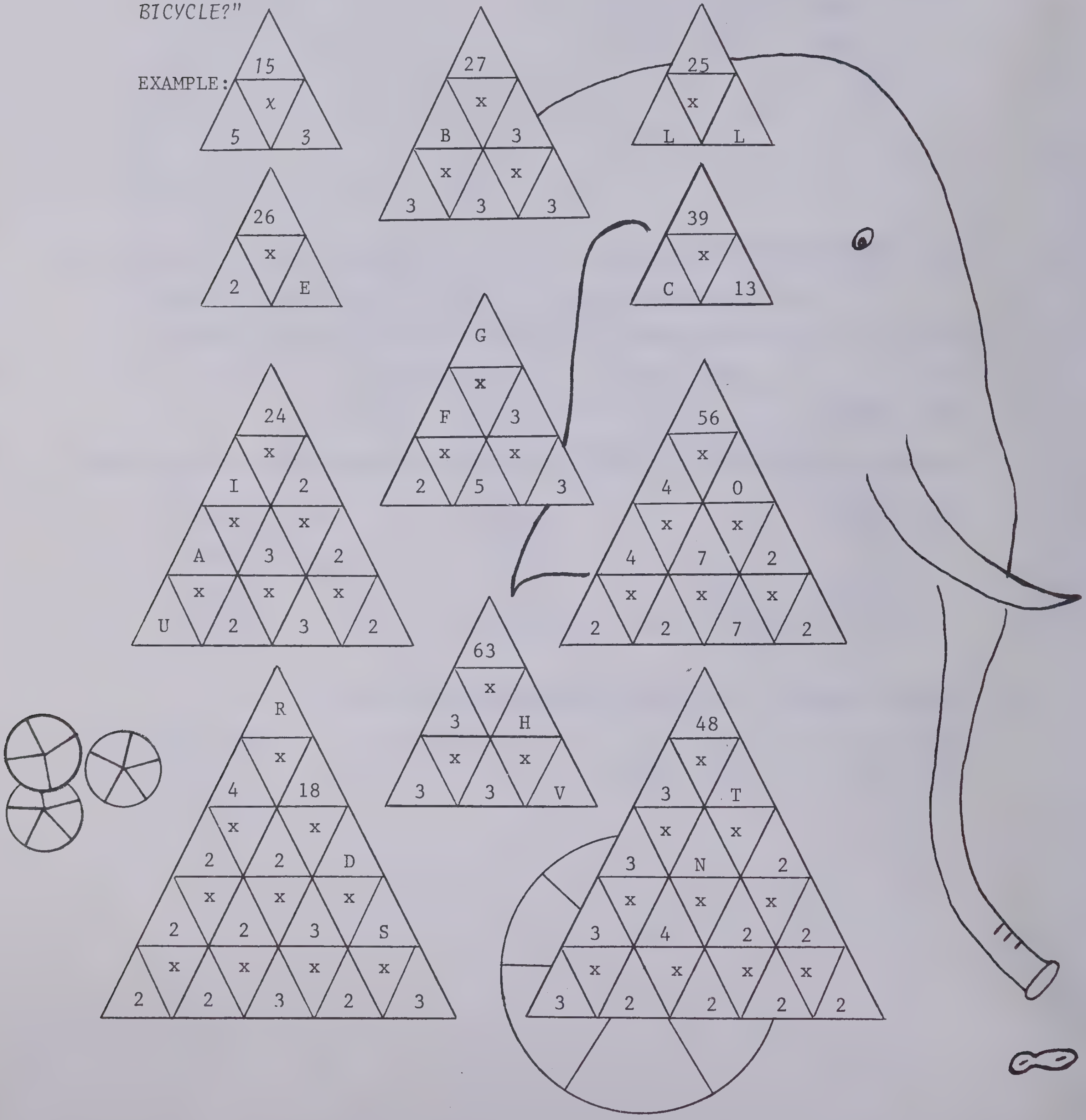
4. Using repeated division, prime factorize the following:

(a) 78 (b) 144 (c) 484 (d) 525

(e) 990 (f) 936

5. Find the numbers which would be used to replace the letters in the following factor tents.

Use the number code to discover . . . *"WHY CAN'T AN ELEPHANT RIDE A BICYCLE?"*



9 13 3 4 2 6 13   21 13   18 14 13 6 8 16

21 4 7 13 4   5 12 16 16 5 13   10 12 8 30 13 72

16 14   72 12 8 30   16 21 13   9 13 5 5

6. Determine the prime factorization of each number in the list and place its factorization in an appropriate factor tent.

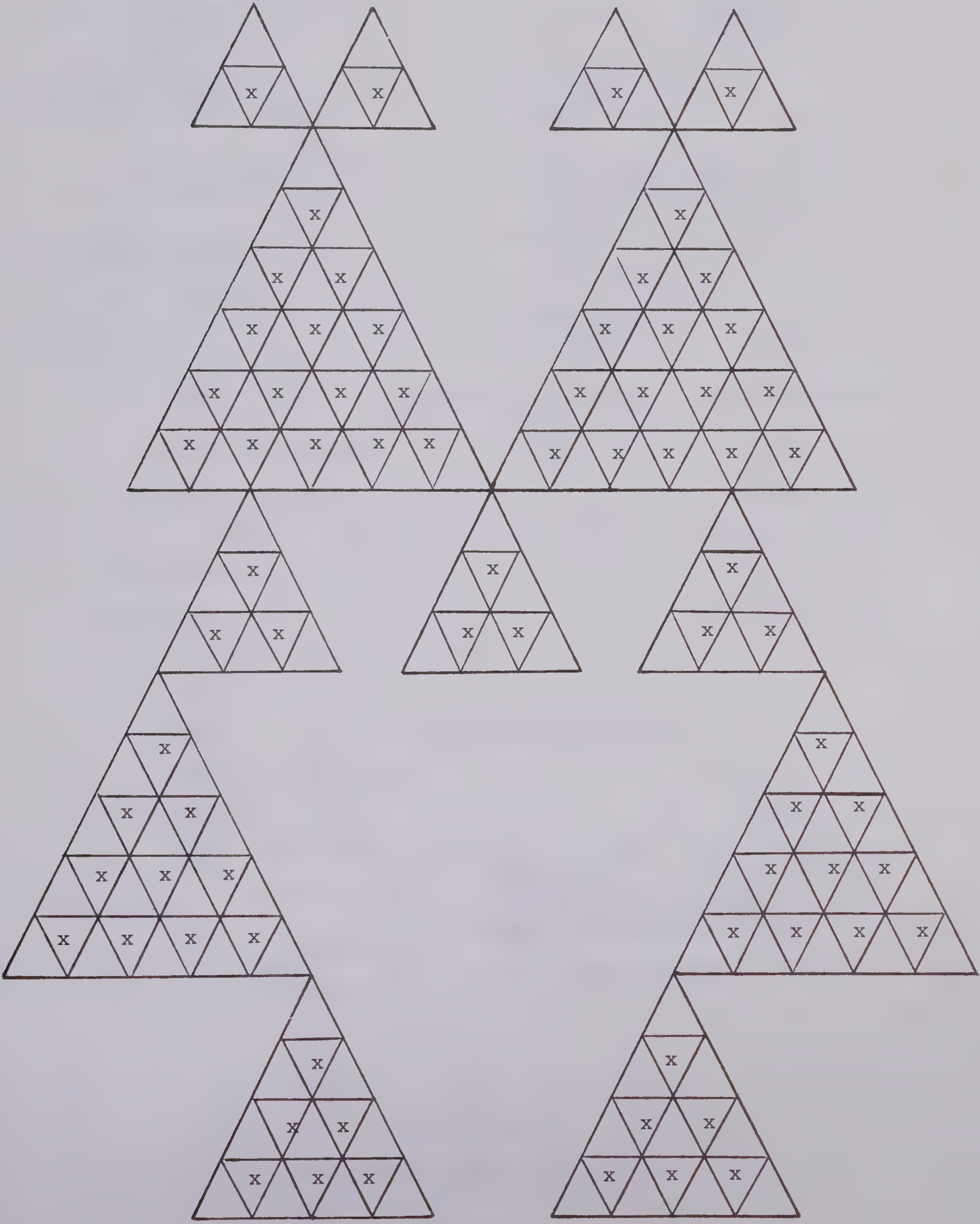
95 32 51

144 25

20 42 54

70 48

87 100 360



G.C.F. - The largest number that is a factor of two or more given numbers is the G.C.F. of those numbers.
- The G.C.F. of 15 and 25 is 5

1. Complete the following:

(a)
2 /30 72
3 /15 ☐
☐ 12

G.C.F. of 30 and 72 is:

(b)
5 /75 100 125
☐ /15 20 ☐
3 ☐ ☐

G.C.F. of 75, 100, 125 is:

(c)
☐ /72 108 252 672
☐ /36 ☐ ☐ ☐
☐ /☐ ☐ 63 ☐
6 9 21 56

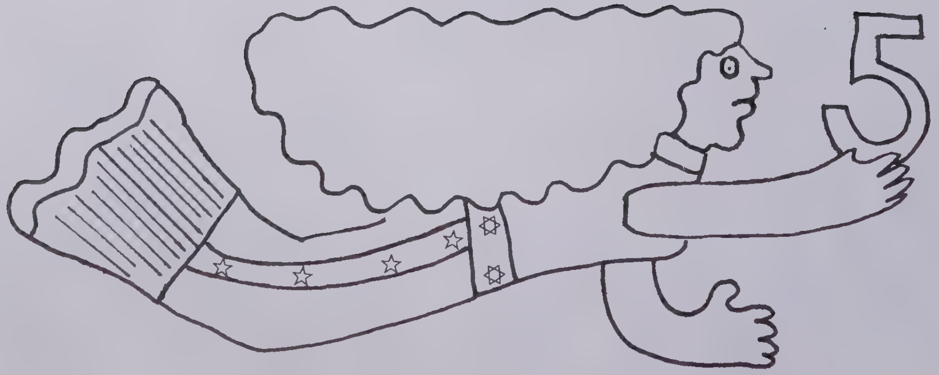
G.C.F. of 72, 108, 252, 672 is:

(d)
☐ / 8 12 15
☐ ☐ 15

G.C.F. of 8, 12, 15 is:

2. Find the G.C.F. of each set of numbers.

(a) 3, 6
(b) 12, 18
(c) 14, 21, 35
(d) 60, 84
(e) 27, 36, 72
(f) 36, 90, 210
(g) 24, 48, 132, 240
(h) 306, 936
(i) 37, 74, 148, 296



EXERCISES:

1. Use your knowledge of the L.C.M. method to fill in the boxes in each question below.

(a)
2 /12 28
2 /☐ 14
3 ☐

L.C.M. of 12, 28:

(b)
3 /6 15 24
2 /☐ 5 ☐
1 ☐ 4

L.C.M. of 6, 15, 24:

(c)
3 /12 ☐ 35
5 /☐ 5 ☐
4 1 7

L.C.M. of 12, ☐ , 35:

(d)
3 /9 ☐ 24
☐ 7 ☐

L.C.M. of 9, ☐ , 24:

(e)
2 /8 ☐ 20 ☐
2 /☐ 6 ☐ 15
☐ /☐ 3 5 ☐
3 /2 1 3
☐ 1 ☐ 1

L.C.M. of 8, ☐ , 20, ☐ :

(f)
☐ /8 24 40
2 /4 12 20
2 /2 ☐ ☐
☐ 3 5

L.C.M. of 8, 24, 40:

2. Find the L.C.M. of the following groups of numbers:

e.g. 12, 15, 24

3 /12, 15, 24
2 / 4, 5 8
2 / 2 5 4
1 5 2

3 x 2 x 2 x 1 x 5 x 2 = 120

L.C.M. = 120

(a) 45, 60
(b) 33, 22
(c) 16, 28, 40
(d) 15, 12, 6
(e) 8, 9, 70, 100
(f) 21, 90, 33
(g) 25, 100, 160, 1000
(h) 11, 8, 32, 60

L.C.M. Means Lowest Common Multiple

1. Determine whether or not the following pairs of numbers are relatively prime:

   (a) 17, 14

   (b) 16, 48

   (c) 25, 49

   (d) 64, 97

   (e) 21, 68

   (f) 36, 37

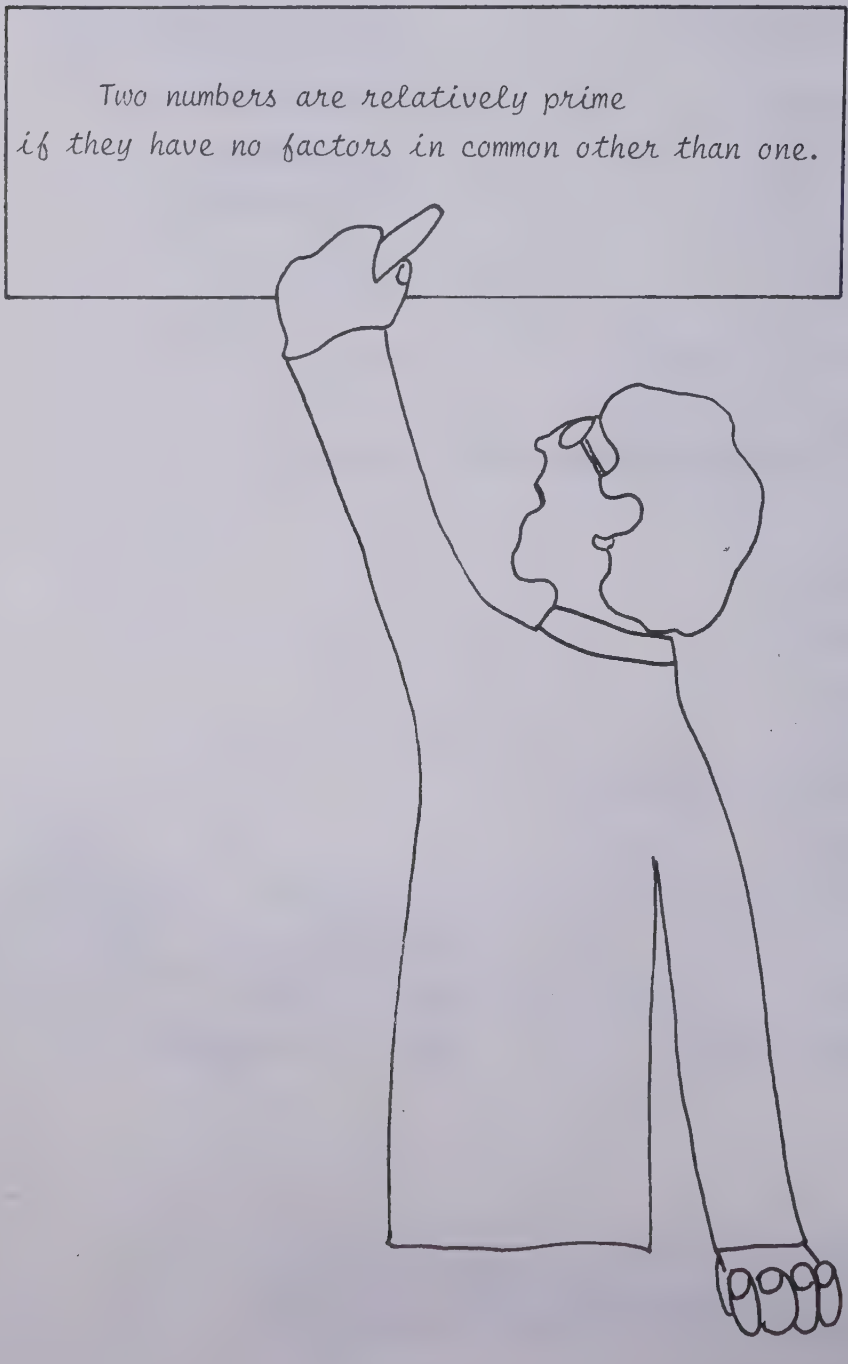
   (g) 19, 57

   (h) 69, 153

   (i) 17, 91

   (j) 184, 258

2. From the above exercises, find the G.C.F. for those which are NOT relatively prime.



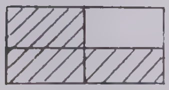
Two numbers are relatively prime if they have no factors in common other than one.

EXERCISES:

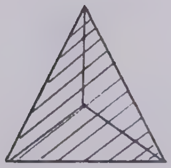
OBJECTIVE NO. B-1

1. Below are five diagrams. Give the fraction that is represented by the shaded area.

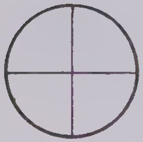
(a)



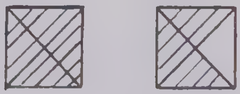
(b)



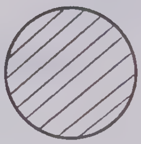
(c)



(d)



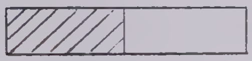
(e)



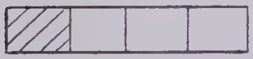
2. The numerator is 6. The denominator is 11. Make a fraction that would be represented by the above numbers.

3. Draw a line matching two picture models to show equivalent fractions.

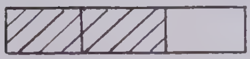
(1)



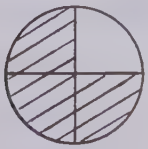
(2)



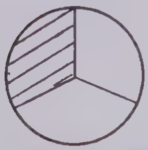
(3)



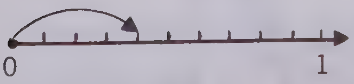
(4)



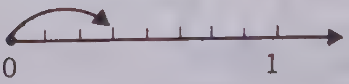
(5)



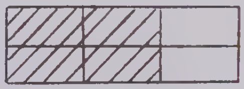
(6)



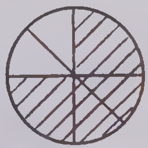
(7)



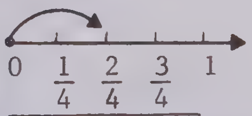
(a)



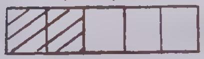
(b)



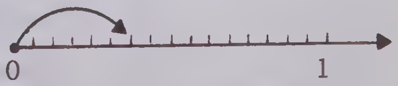
(c)



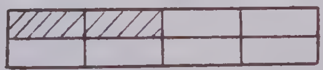
(d)



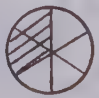
(e)



(f)



(g)



4. Decide whether the following are equivalent.

(a) $\frac{7}{8}, \frac{3}{4}$ (b) $\frac{0}{5}, \frac{0}{8}$

(c) $\frac{4}{3}, \frac{12}{9}$ (d) $\frac{2}{3}, \frac{6}{7}$

(e) $\frac{1}{4}, \frac{2}{7}$

5. Find the basic fraction for each.

(a) $\frac{27}{30}$ (b) $\frac{20}{25}$

(c) $\frac{14}{16}$ (d) $\frac{110}{121}$

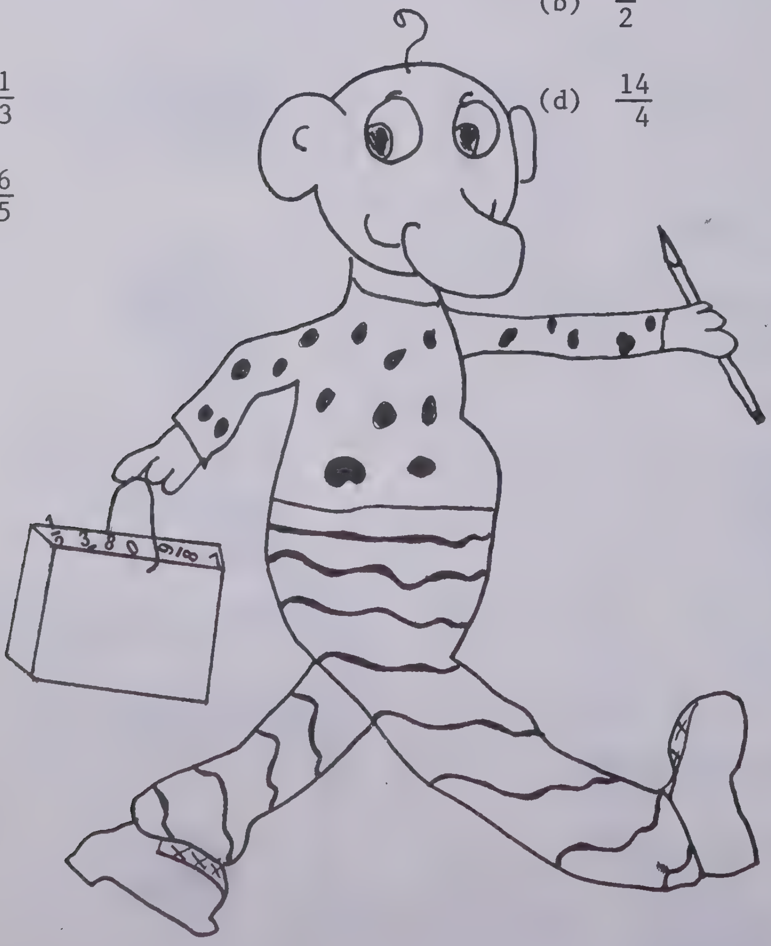
(e) $\frac{12}{15}$

6. Write the following as mixed numbers.

(a) $\frac{7}{6}$ (b) $\frac{9}{2}$

(c) $\frac{11}{3}$ (d) $\frac{14}{4}$

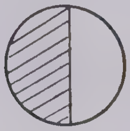
(e) $\frac{16}{5}$



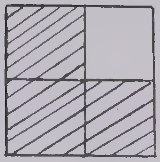
EXERCISES: OBJECTIVE NO. B-3

1. Tell what part of each is shaded using fractions of the form $\frac{a}{b}$.

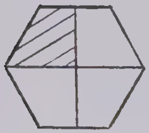
(a)



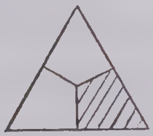
(b)



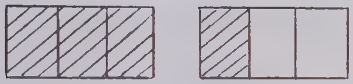
(c)



(d)



(e)



(f) In the fraction $\frac{a}{b}$, a is called the ______ and b is called the ______.

2. What fraction is expressed when:

(a) 50 of a group of 100 children are boys.
(b) of 120 stamps, 37 are Canadian stamps.
(c) Bob spent 18 of his 20 dollars.
(d) 8 red markers out of a group of 120 markers.
(e) 10 students in a class of 35 had their homework completed.

3. What fraction is expressed when:

(a) a ruler is marked off with 10 parts to the centimetre and you consider 7 of them.
(b) the large hand of a clock moves through 30 minutes.
(c) 4 eggs out of a dozen are needed for a cake.
(d) the point is half the distance between one and two on the number line.
(e) if a container of water is divided into eight equal parts and four of them are poured out, how much is left?

4. What fraction is expressed when:

(a) 2 cans of soup sell for 45¢.
(b) a car travels 240 kilometres in 3 hours.
(c) Paul has 300 stamps. John has 100.
(d) 150 people donated $1500.
(e) for every 10 people 3 have blue eyes.

5. Write fractions as division. NOTE: What is being divided.

   (a) One lunch must be shared by two friends.

   (b) 15 lockers must be shared by 45 girls.

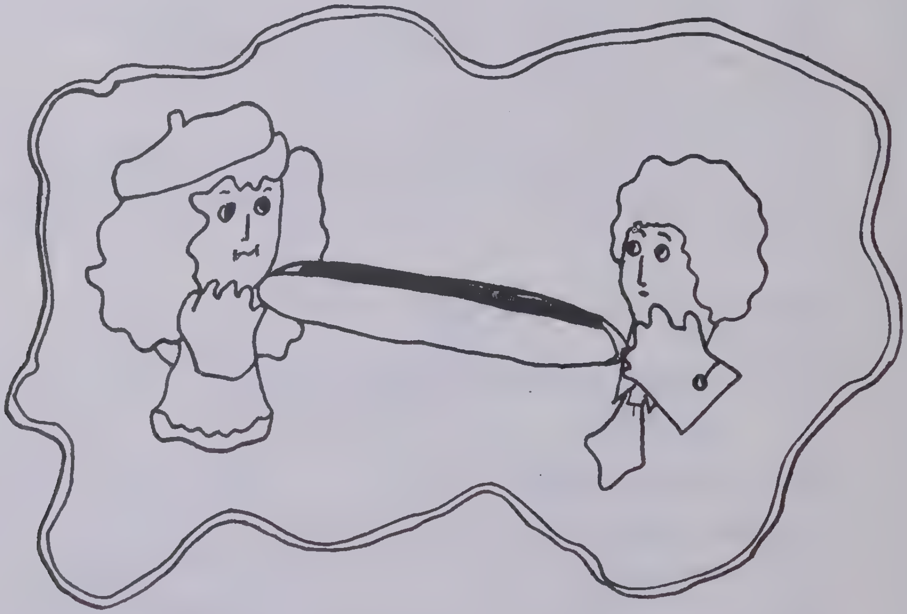
   (c) A cake is cut up for 16 people.

   (d) 5 bags of candy are handed out to 26 children.

   (e) $95 will buy four chairs.

A FRACTION CAN BE USED TO SHOW

1. *Part of a whole*
2. *Part of a group*
3. *Measure*
4. *Ratio*
5. *Division*



1. Locate each fraction on a separate number line.

   (a) $\frac{2}{3}$ (b) $\frac{3}{5}$ (c) $\frac{8}{6}$ (d) $\frac{9}{5}$

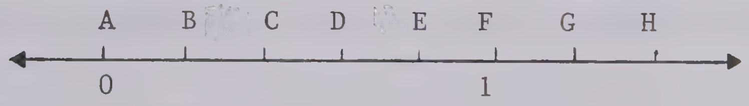
2. Locate each fraction on the same number line.

   (a) $\frac{1}{2}$ (b) $\frac{4}{5}$ (c) $\frac{12}{10}$ (d) $\frac{6}{10}$

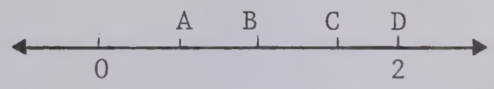
   (e) $\frac{8}{10}$

3. Plot the given fractions on the number line below.

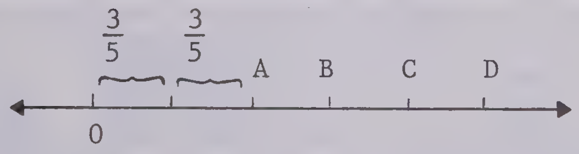
   $\frac{1}{5}$, $\frac{3}{5}$, $\frac{5}{5}$, $\frac{2}{5}$, $\frac{7}{5}$



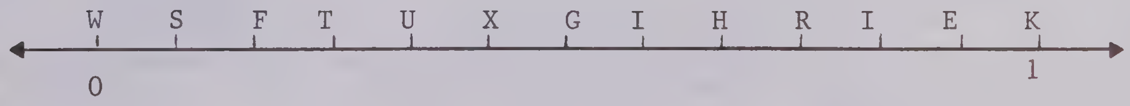
4. Points A, B, C, and D divide the number line from 0 to 2. What fraction is represented by each point?



5. What fractions are represented by points A, B, C, and D?



6. Place the letter from the number line over the fraction that it represents.



I FLUNKED!

$\frac{7}{12}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{11}{12}$	$\frac{1}{12}$

BE SURE:

1. *the divisions on your number line always represent the same unit.*
2. *the points on your number line are labelled.*

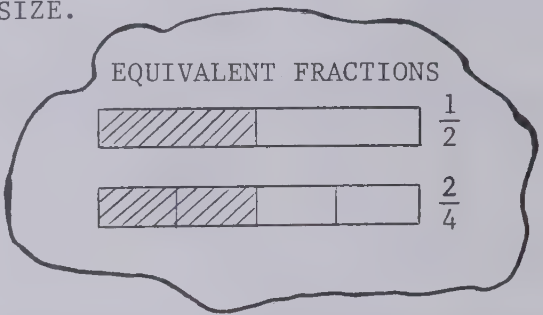
EXERCISES: OBJECTIVE NO. B-7

I. For each exercise, draw two pictures to show that the fractions are equivalent. KEEP YOUR DIAGRAMS THE SAME SIZE.

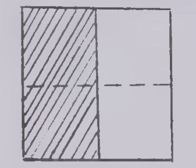
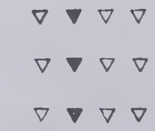
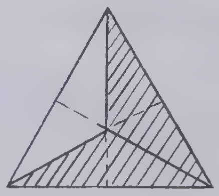
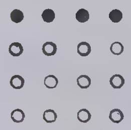
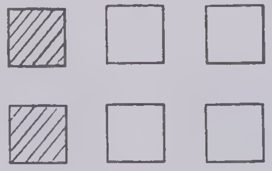
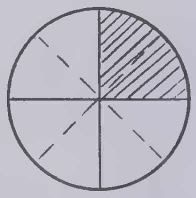
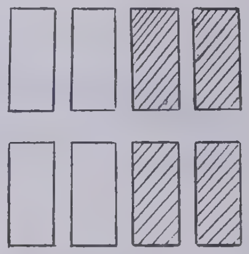
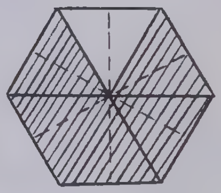
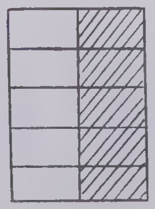
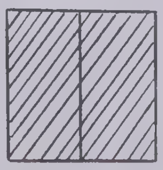
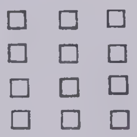
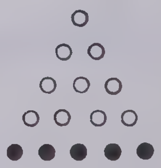
A) $\frac{2}{6}, \frac{1}{3}$ B) $\frac{2}{10}, \frac{1}{5}$

C) $\frac{5}{15}, \frac{1}{3}$ D) $\frac{8}{8}, \frac{4}{4}$

E) $\frac{8}{12}, \frac{4}{6}$ F) $\frac{2}{8}, \frac{1}{4}$



II. Each exercise below suggests a pair of equivalent fractions. Give a pair of equivalent fractions for each figure. ONE MUST BE THE BASIC FRACTION.

1 	2 	3 	4 
5 	6 	7 	8 
9 	10 	11 	12 

III. Give two equivalent fractions. Obtain one by multiplying and one by dividing. DO NOT WRITE AS MIXED NUMBERS.

A) $\frac{12}{24}$ B) $\frac{8}{10}$ C) $\frac{28}{18}$ D) $\frac{2}{6}$

III. Cont'd.

E) $\frac{30}{25}$ F) $\frac{5}{5}$ G) $\frac{18}{3}$ H) $\frac{12}{15}$

$\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$, $\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$, $\frac{1}{2} \times \frac{4}{4} = \frac{4}{8}$

$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$, $\frac{1}{2} \times \frac{6}{6} = \frac{6}{12}$ $\therefore$ The set of fractions equivalent to $\frac{1}{2}$ is

$$\left\{ \frac{2}{4}, \frac{3}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}, \frac{6}{12} \cdots \right\}$$

IV. For each exercise, specify if the fractions are equivalent.

A) $\frac{1}{2}, \frac{3}{5}$ C) $\frac{7}{6}, \frac{14}{10}$ E) $\frac{2}{3}, \frac{14}{21}$

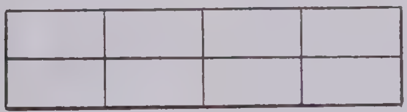
B) $\frac{3}{9}, \frac{1}{3}$ D) $\frac{15}{3}, \frac{3}{2}$ F) $\frac{7}{8}, \frac{42}{48}$

V. Give the equivalent BASIC fraction. DO NOT WRITE AS A MIXED NUMBER.

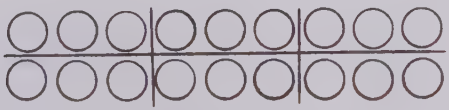
A) $\frac{4}{8}$ C) $\frac{9}{9}$ E) $\frac{6}{21}$ G) $\frac{33}{11}$ I) $\frac{10}{12}$

B) $\frac{15}{10}$ D) $\frac{4}{10}$ F) $\frac{15}{9}$ H) $\frac{54}{48}$ J) $\frac{50}{35}$

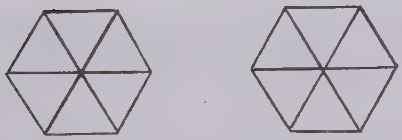
VI. For each picture, colour the amount described. Then give the basic fraction for this amount.



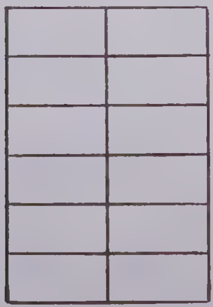
A) Six eighths



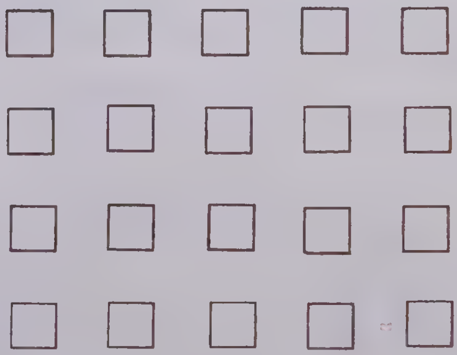
B) Four sixths



C) Ten sixths

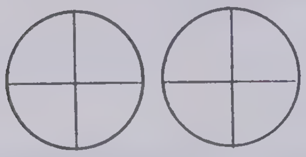


E) Four twelfths

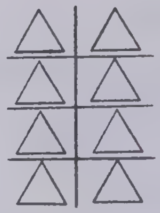


D) Three fifths

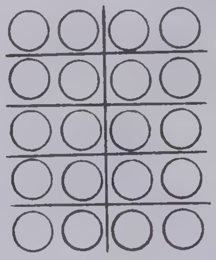
VI. (Cont'd.)



F) Six fourths



G) Four eighths



H) Eight tenths

VII. Tabulate a set of equivalent fractions equivalent to the basic fraction. (Tabulate four). The first one is done for you.

A) $\frac{3}{4}$ C) $\frac{9}{8}$ E) $\frac{7}{5}$ G) $\frac{2}{5}$

B) $\frac{1}{7}$ D) $\frac{3}{10}$ F) $\frac{1}{3}$ H) $\frac{2}{9}$

$$\frac{3 \times 2}{4 \times 2} = \frac{6}{8} \qquad \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

$$\frac{3 \times 4}{4 \times 4} = \frac{12}{16} \qquad \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$$

$$\frac{3}{4} = \left\{ \frac{6}{8}, \frac{9}{12}, \frac{12}{16}, \frac{15}{20} \right\}$$

VIII. Show how the first fraction was used to obtain the second fraction.

A) $\frac{5}{6}, \frac{10}{12}$ D) $\frac{2}{7}, \frac{12}{42}$ G) $\frac{3}{4}, \frac{27}{36}$

B) $\frac{2}{5}, \frac{8}{20}$ E) $\frac{6}{18}, \frac{1}{3}$ H) $\frac{12}{15}, \frac{4}{5}$

C) $\frac{8}{3}, \frac{24}{9}$ F) $\frac{20}{25}, \frac{4}{5}$ I) $\frac{4}{16}, \frac{1}{4}$

IX. *WHY WILL HARRY BE A FIGHT REFEREE?*

To find the answer to this question determine the value for each letter. Place the letter above that value in the code below the exercise. Your answer will appear.

e.g. $\frac{4}{6} = \frac{16}{U}$

$U = 24$

1. $\frac{3}{18} = \frac{A}{6}$
2. $\frac{2}{9} = \frac{Y}{45}$
3. $\frac{1}{2} = \frac{T}{8}$
4. $\frac{14}{49} = \frac{2}{E}$
5. $\frac{1}{4} = \frac{3}{H}$
6. $\frac{3}{\text{"O"}} = \frac{36}{24}$
7. $\frac{N}{32} = \frac{2}{8}$
8. $\frac{C}{15} = \frac{1}{3}$
9. $\frac{42}{56} = \frac{L}{8}$

$\overline{12}, \overline{7} \quad \overline{5}, \overline{1}, \overline{8} \quad \overline{2}, \overline{8}, \overline{6}, \overline{10} \quad \overline{5}, \overline{2}, \overset{U}{\overline{24}}, \overline{8}, \overline{4} \quad \overline{4}, \overline{2} \quad \overline{4}, \overline{7}, \overline{8}$

X. What natural number can you use for each fraction. Give four other fractions you can use for this number.

A) $\frac{2}{1} = 2 = \frac{4}{2} = \frac{6}{3} = \frac{8}{4}$

B) $\frac{7}{1}$

C) $\frac{8}{1}$

D) $\frac{200}{1}$

E) $\frac{700}{1}$

F) $\frac{150}{1}$

XI. For each exercise, give three equivalent fractions.

A) $\frac{9}{12} = \frac{3}{4} = \frac{6}{8} = \frac{75}{100}$

B) $\frac{7}{7}$

C) $\frac{8}{14}$

D) $\frac{20}{30}$

E) $\frac{6}{15}$

F) $\frac{2}{9}$

G) $\frac{72}{54}$

H) $\frac{36}{42}$

I) $\frac{18}{6}$

EXERCISES:

OBJECTIVE NO. B-8

I. A) List the multiples (to 54) of 6.

B) List the multiples (to 54) of 9.

C) List the common multiples(to 54) of 6 and 9.

D) What is the L.C.M. of 6 and 9?

E) What is the L.C.D. of $\frac{1}{6}$ and $\frac{1}{9}$?

The multiples of 2 are 2,4,6,8,10 ...

The multiples of 5 are 5,10,15,20 ...

The common multiples of 2 and 5 are 10,20,30 ...

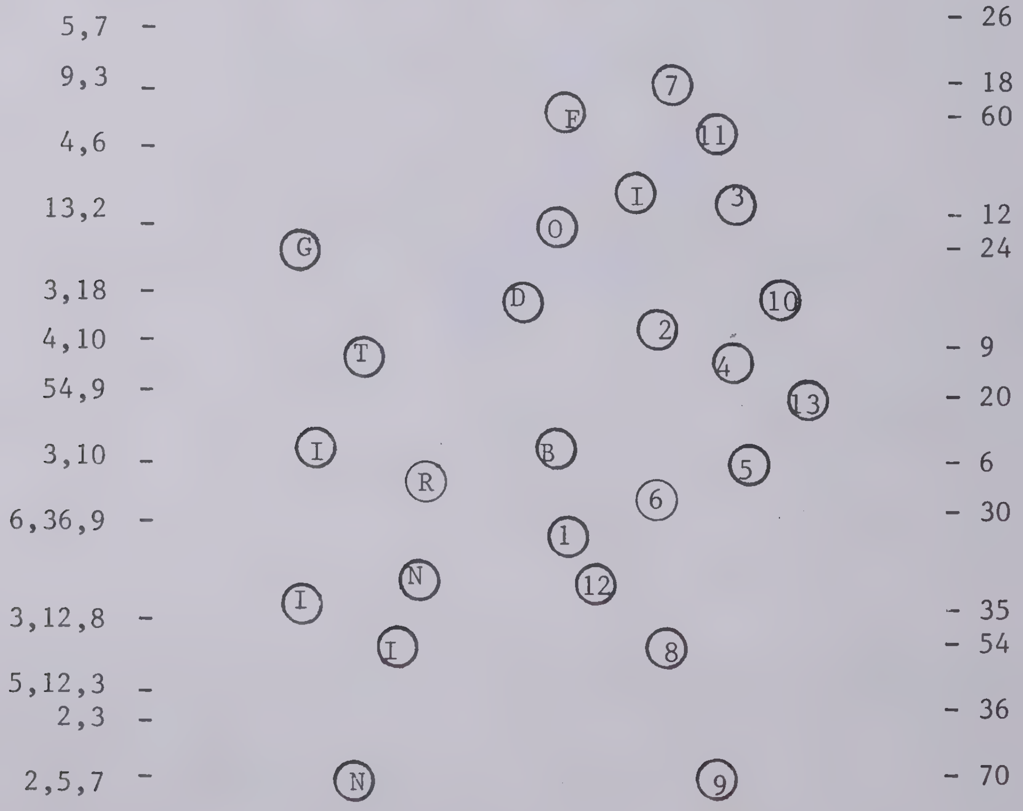
The L.C.M. of 2 and 5 is 10

The L.C.D. for $\frac{1}{2}$ and $\frac{1}{5}$ is 10

II. MORE DRILL?

HOW DO YOU FIND THE DENTIST'S DRILL?

Figure out the L.C.M. for each set of numbers on the left. Draw a straight line connecting each problem with its answer. Each line will cross a number and a letter. The number tells you where to put the letter in the line below the questions.



___   ___ ___ ___ ___   ___ ___   ___ ___ ___ ___ ___ ___

2   7 3 8 5   1 13   4 10 6 12 9 11

III. Circle each number that you could use as a common denominator for the fractions named.

A) $\frac{2}{3}$ and $\frac{3}{4}$

8, 10, 12, 18, 24, 30

B) $\frac{5}{12}$ and $\frac{1}{3}$

12, 15, 18, 24, 36, 48

C) $\frac{5}{2}$ and $\frac{6}{7}$

7, 14, 21, 28, 42, 54

D) $\frac{7}{8}$ and $\frac{4}{3}$

8, 24, 30, 36, 96

E) $\frac{5}{6}$ and $\frac{9}{8}$

8, 18, 24, 36, 48, 96

F) $\frac{1}{10}$ and $\frac{7}{15}$

15, 30, 40, 50, 60, 80

G) $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{4}{3}$

12, 16, 18, 24, 32, 36

H) $\frac{2}{3}$, $\frac{5}{6}$ and $\frac{1}{9}$

8, 12, 18, 36, 42, 54

IV. For the fractions in each exercise, find the L.C.D. Then give the equivalent fractions using this denominator.

A) $\frac{2}{5}, \frac{1}{7}$

B) $\frac{13}{11}, \frac{5}{2}$

C) $\frac{9}{5}, \frac{3}{4}$

D) $\frac{3}{2}, \frac{5}{9}$

E) $\frac{6}{7}, \frac{1}{4}$

F) $\frac{2}{3}, \frac{4}{5}$

G) $\frac{1}{3}, \frac{11}{12}$

H) $\frac{1}{4}, \frac{3}{8}$

I) $\frac{17}{27}, \frac{5}{9}$

J) $\frac{1}{6}, \frac{7}{10}$

K) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$

L) $\frac{2}{7}. \frac{7}{4}, \frac{3}{28}$

M) $\frac{19}{10}, \frac{7}{3}, \frac{5}{2}$

N) $\frac{4}{5}, \frac{5}{6}, \frac{4}{15}$

O) $\frac{7}{8}, \frac{2}{3}, \frac{11}{12}$

P) $\frac{1}{25}, \frac{1}{10}, \frac{1}{4}$

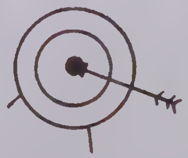
FOR X-PERTS ONLY

Q) $\frac{9}{18}, \frac{29}{60}, \frac{23}{45}$

R) $\frac{7}{8}, \frac{9}{10}, \frac{13}{16}$

S) $\frac{11}{12}, \frac{15}{16}, \frac{9}{10}$

T) $\frac{32}{40}, \frac{19}{25}, \frac{21}{32}, \frac{39}{50}$



V. For each pair of fractions, give the least common denominator. Then express each fraction as a fraction with this denominator.

	L.C.D.	First Fraction	Second Fraction
A) $\frac{1}{12}, \frac{5}{6}$	12	$\frac{1}{12} = \frac{1}{12}$	$\frac{5}{6} = \frac{10}{12}$

B) $\frac{2}{5}, \frac{4}{25}$

C) $\frac{3}{4}, \frac{9}{10}$

D) $\frac{7}{3}, \frac{3}{8}$

E) $\frac{5}{6}, \frac{3}{4}$

F) $\frac{5}{2}, \frac{4}{9}$

G) $\frac{3}{5}, \frac{1}{6}$

H) $\frac{7}{10}, \frac{5}{8}$

I) $\frac{8}{9}, \frac{7}{6}$

J) $\frac{4}{5}, \frac{3}{4}$

K) $\frac{4}{9}, \frac{1}{12}$

L) $\frac{1}{17}, \frac{3}{5}$

M) $\frac{6}{7}, \frac{4}{9}$

N) $\frac{5}{8}, \frac{7}{6}$

O) $\frac{1}{13}, \frac{1}{7}$

EXERCISES: OBJECTIVE NO. B-9

I. 1. Find the prime factorizations of 30, 42, 110, 140, 300

2. Find the G.C.F. of 36, 60; 600, 180; 35, 200

3. *HOW DID YOU GET THAT GLASS OF ORANGE JUICE?*

To discover the answer reduce the following fractions. Find your answer in the answer section. The number in front of the answer tells you where to put the letter of the problem in the row of boxes at the bottom of the answers.

Ⓐ $\frac{3}{9}$
Ⓘ $\frac{14}{21}$
Ⓖ $\frac{40}{50}$
Ⓤ $\frac{45}{60}$
Ⓔ $\frac{24}{27}$

Ⓘ $\frac{64}{12}$
Ⓐ $\frac{28}{56}$
Ⓢ $\frac{70}{28}$
Ⓠ $\frac{21}{36}$
Ⓦ $\frac{85}{100}$

Ⓣ $\frac{16}{72}$
Ⓔ $\frac{35}{200}$
Ⓗ $\frac{49}{21}$
Ⓩ $\frac{144}{200}$
Ⓢ $\frac{25}{3000}$

Ⓣ $\frac{10}{16}$
Ⓔ $\frac{6}{48}$
Ⓣ $\frac{15}{40}$

ANSWERS

① $\frac{2}{3}$
② $\frac{2}{9}$
③ $\frac{17}{20}$
④ $\frac{1}{3}$

⑤ $\frac{5}{2}$
⑥ $\frac{1}{2}$
⑦ $\frac{5}{8}$
⑧ $\frac{16}{3}$

⑨ $\frac{4}{5}$
⑩ $\frac{7}{3}$
⑪ $\frac{3}{8}$
⑫ $\frac{1}{120}$

⑬ $\frac{7}{12}$
⑭ $\frac{3}{4}$
⑮ $\frac{8}{9}$
⑯ $\frac{7}{40}$

⑰ $\frac{18}{25}$
⑱ $\frac{1}{8}$

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

EXERCISES: OBJECTIVE NO. B-10

1. ADD:

(a) $\frac{3}{4} + \frac{5}{4} =$ (b) $\frac{3}{5} + \frac{1}{5} =$ (c) $\frac{3}{9} + \frac{4}{9} + \frac{7}{9} =$

(d) $\frac{5}{3} + \frac{7}{3} =$ (e) $\frac{3}{8} + \frac{5}{8} =$ (f) $\frac{2}{7} + \frac{1}{7} + \frac{3}{7} =$

2. What is the L.C.D. for each set?

(a) $\frac{2}{3} + \frac{1}{6} =$ (b) $\frac{3}{5} + \frac{3}{10} =$ (c) $\frac{1}{6} + \frac{1}{9} =$

(d) $\frac{7}{8} + \frac{3}{4} =$ (e) $\frac{2}{3} + \frac{3}{9} + \frac{1}{6} =$

3. ADD:

(a) $\frac{5}{6} + \frac{1}{4} =$ (b) $\frac{1}{5} + \frac{3}{4} =$ (c) $\frac{5}{8} + \frac{1}{4} =$

(d) $\frac{5}{6} + \frac{2}{3} =$ (e) $\frac{3}{5} + \frac{2}{3} + \frac{1}{10} =$

4. ADD:

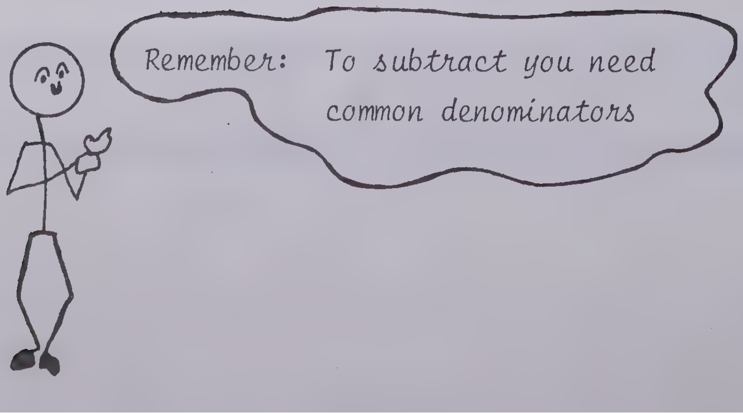
(a) $\frac{5}{8} + \frac{3}{4} =$ (b) $\frac{3}{9} + \frac{7}{6} =$ (c) $\frac{1}{2} + \frac{4}{5} =$

(d) $\frac{2}{9} + \frac{5}{9} =$

5. SUBTRACT:

(a) $\frac{4}{5} - \frac{3}{5} =$ (b) $\frac{9}{10} - \frac{0}{10} =$ (c) $\frac{7}{9} - \frac{3}{9} =$

(d) $\frac{2}{3} - \frac{1}{2} =$ (e) $\frac{13}{4} - \frac{11}{8} =$ (f) $\frac{8}{9} - \frac{1}{3} =$


Remember: To subtract you need common denominators

6. What is the title of this picture?

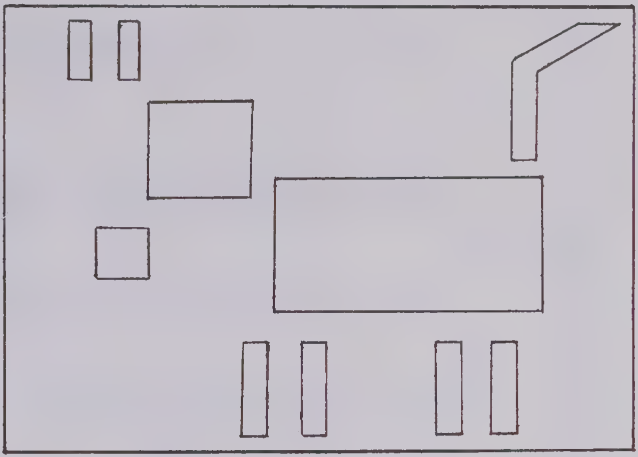
TO DECODE THE TITLE:

(a) Work the problems below.

(b) Find the answer in the code.

(c) Each time the answer appears in the code, write the letter that matches the answer in the blank.

(d) Work until you have discovered the title.



____

$L = \frac{1}{2} + \frac{1}{5}$

$I = \frac{1}{3} + \frac{1}{7}$

$F = \frac{1}{4} + \frac{1}{6}$

$E = \frac{2}{3} + \frac{2}{7}$

$U = \frac{3}{8} + \frac{4}{9}$

$T = \frac{2}{5} + \frac{5}{8}$

$S = \frac{1}{3} + \frac{4}{5}$

$Q = \frac{3}{5} + \frac{2}{7}$

$K = \frac{7}{9} - \frac{1}{3}$

$O = \frac{3}{4} - \frac{1}{6}$

$B = \frac{1}{2} - \frac{1}{3}$

$R = \frac{3}{3} - \frac{1}{5}$

$N = \frac{3}{9} - \frac{1}{3}$

$A = \frac{3}{4} - \frac{5}{7}$

$G = \frac{5}{1} - \frac{3}{4}$

$D = \frac{3}{5} - \frac{3}{8}$

$\frac{4}{9}$ $\frac{10}{21}$ $1\frac{1}{40}$ $\frac{5}{12}$ $\frac{7}{12}$ $\frac{4}{5}$

$\frac{1}{6}$ $\frac{59}{72}$ $\frac{10}{21}$ $\frac{7}{10}$ $\frac{9}{40}$ $\frac{10}{21}$ 0 $4\frac{1}{4}$

$\frac{1}{28}$ $1\frac{2}{15}$ $\frac{31}{35}$ $\frac{59}{72}$ $\frac{1}{28}$ $\frac{4}{5}$ $\frac{20}{21}$

$\frac{9}{40}$ $\frac{7}{12}$ $4\frac{1}{4}$

1. Carry out the operations

EXAMPLES:

i) $\frac{2}{3} \times \frac{1}{8} = \frac{\overset{1}{\cancel{2}} \times 1}{3 \times \underset{4}{\cancel{8}}} = \frac{1}{12}$

ii) $2\frac{1}{2} \times 3\frac{1}{4} = \frac{5}{2} \times \frac{13}{4} = \frac{5 \times 13}{2 \times 4} = \frac{65}{8} = 8\frac{1}{8}$

iii) $\frac{5}{2} \div \frac{3}{7} = \frac{35 \div 6}{14 \div 14} = \frac{35 \div 6}{1} = 5\frac{5}{6}$

iv) $\frac{5}{2} \div \frac{3}{7} = \frac{5}{2} \times \frac{7}{3} = \frac{5 \times 7}{2 \times 3} = \frac{35}{6} = 5\frac{5}{6}$

v) $6\frac{1}{8} \div 2\frac{1}{3} = \frac{49}{8} \div \frac{7}{3} = \frac{\overset{7}{\cancel{49}}}{8} \times \frac{3}{\underset{1}{\cancel{7}}} = \frac{21}{8} = 2\frac{5}{8}$

a) $\frac{2}{3} \times \frac{6}{7} =$

b) $\frac{3}{5} \times \frac{9}{10} =$

c) $8 \times \frac{2}{3} =$

d) $4 \times \frac{5}{8} =$

e) $\frac{7}{8} \times 1\frac{1}{4} =$

f) $1\frac{4}{5} \times 3\frac{1}{3} =$

g) $2\frac{1}{2} \times 1\frac{1}{5} =$

h) $1\frac{1}{2} \times \frac{4}{5} \times 2\frac{1}{6} =$

i) $\frac{3}{4} \div \frac{5}{8} =$

j) $\frac{2}{3} \div \frac{1}{5} =$

k) $\frac{3}{8} \div \frac{5}{7} =$

l) $6 \div 4\frac{1}{2} =$

m) $\frac{7}{8} \div 2 =$

n) $5\frac{5}{9} \div 10 =$

o) $12 \div 4\frac{1}{2} =$

p) $\frac{3}{4} \div 1\frac{3}{5} =$

q) $3\frac{1}{5} \div 1\frac{1}{3} =$

r) $2\frac{2}{3} \div 1\frac{5}{9} =$

FIND THE BINGO

FIRST Work out any problem below in lowest terms.

SECOND: Find the answer in the bingo card and cross out the space it is in.

THIRD: Any five correct answers in a straight line (horizontally, vertically, or diagonally) completes the exercise.

$\frac{2}{11}$	6	$\frac{4}{7}$	4	$2\frac{1}{3}$
$\frac{5}{7}$	$\frac{7}{22}$	$\frac{1}{9}$	$\frac{3}{20}$	2
$2\frac{2}{7}$	$\frac{3}{19}$	$5\frac{1}{2}$	$\frac{7}{16}$	$\frac{2}{3}$
$\frac{1}{2}$	$\frac{6}{25}$	$\frac{1}{8}$	$4\frac{3}{4}$	$\frac{1}{7}$
$\frac{1}{12}$	$\frac{1}{3}$	$1\frac{1}{15}$	$1\frac{1}{2}$	12

$\frac{7}{10} \div 2\frac{1}{5}$

$\frac{6}{5} \times \frac{10}{3} =$

$\frac{3}{8} \times 4 =$

$\frac{7}{8} \div 2 =$

$1 \div 7 =$

$\frac{2}{3} \times \frac{1}{2} =$

$\frac{1}{8} \div \frac{1}{4} =$

$2\frac{1}{2} \times \frac{4}{5} =$

$\frac{8}{10} \times \frac{3}{10} =$

$\frac{4}{5} \div \frac{3}{4} =$

$\frac{7}{3} \times 1 =$

$16 \div 7 =$

$\frac{3}{5} \times \frac{1}{4} =$

$\frac{4}{7} \times 1\frac{1}{4} =$

$\frac{4}{9} \div 4 =$

$\frac{1}{4} \div 3 =$

$5 \div \frac{5}{8} =$

$\frac{11}{10} \div \frac{1}{5} =$

$8 \times \frac{3}{4} =$

$\frac{3}{5} \div \frac{9}{10} =$

$4\frac{3}{4} \div 1 =$

REVIEW EXERCISES: OBJECTIVE NO'S. B-10 - B-12

Solve the questions below to find the answer to the riddle. Place the letter for each question in the space above the answer.

1. If a hen-and-a-half layed an egg-and-a-half in a day and a half what would you have in five days?

____ ____ ____ ____ ____   ____ ____ ____ ____ ____ ____ ____

$$4 \quad \frac{1}{18} \quad 1\frac{1}{10} \quad \frac{9}{28} \quad \frac{1}{2} \qquad\quad \frac{3}{4} \quad \frac{7}{12} \quad \frac{2}{3} \quad \frac{3}{4} \quad 5\frac{3}{4} \quad \frac{11}{12} \quad \frac{3}{8}$$

$\frac{3}{4} + \frac{1}{6} = E$

$\frac{6}{7} \div \frac{3}{14} = R$

$\frac{5}{8} \times \frac{4}{5} = T$

$2\frac{1}{2} + 3\frac{1}{4} = K$

$\frac{3}{10} \div \frac{2}{5} = C$

$\frac{3}{4} - \frac{3}{7} = S$

$\frac{1}{3} + \frac{3}{5} + \frac{1}{6} = A$

$5\frac{1}{4} - 4\frac{2}{3} = H$

$\frac{1}{4} \div \frac{2}{3} = N$

$\frac{5}{6} \times \frac{3}{5} \times 1\frac{1}{3} = I$

$\frac{1}{2} \times \frac{1}{9} = 0$

2. What do we call a toe which has had an unfortunate experience with a buzz saw?

____ ____ ____ ____ ____ ____ ____   ____ ____ ____ ____ ____

$$\frac{7}{8} \quad \frac{2}{3} \quad 3 \quad \frac{1}{15} \quad \frac{1}{2} \quad \frac{8}{27} \quad 1 \qquad\quad \frac{1}{15} \quad 3 \quad \frac{1}{2} \quad 3 \quad 1$$

$T = \frac{7}{8} \times \frac{4}{5} \times 1\frac{3}{7}$

$A = \frac{3}{8} + \frac{1}{2}$

$M = \frac{4}{9} \div \frac{2}{3}$

$G = \frac{9}{10} - \frac{2}{5}$

$D = \frac{2}{3} - \frac{3}{5}$

$E = \frac{2}{9} \div \frac{3}{4}$

$I = 2\frac{2}{5} \times 1\frac{1}{4}$

3. Copy the following in your book and solve as quickly as possible. Time yourself. The first one is done for you.

x ÷	$\frac{1}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{9}{10}$
$\frac{4}{7}$	$\frac{1}{14}$ $4\frac{4}{7}$					
$\frac{1}{6}$						
$\frac{5}{9}$						
$\frac{2}{3}$						
$\frac{6}{7}$						
$\frac{7}{8}$						

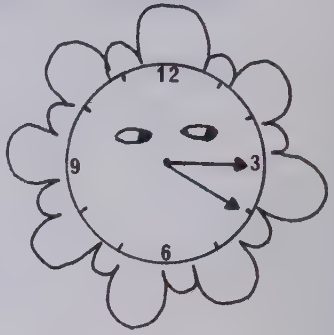
Number of Right Answers _____

Time _____

EXERCISES: OBJECTIVE NO. B-14

1. Race the Clock:

Calculate the following as quickly as you can:



(a) $\frac{1}{2} \times \frac{3}{4} \div \frac{3}{4} =$

(b) $1 \div \frac{1}{2} =$

(c) $13(12 - 10) =$

(d) $47 \times 12 =$

(e) $\frac{1}{2} + \frac{2}{3} + \frac{1}{2} =$

(f) $3\frac{1}{4} \times 8 =$

(g) $2071 + 196 + 44 =$

(h) $4 + 7 - 3 - 4 =$

Now, go back and use the following code to see if you are a winner against the clock.

ALLOWED TIME:

D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
2405	2	4	$\frac{7}{16}$	$1\frac{3}{5}$	26	$\frac{3}{4}$	39	$\frac{5}{8}$	$\frac{1}{2}$	$1\frac{2}{3}$	$10\frac{1}{4}$	502	$8\frac{1}{2}$	19	2311	$12\frac{1}{2}$	17	564

CODE:

Match the answers to the questions with the letters above, unscramble them, and the time spelled out is the qualifying time.

_______ _______ _______ _______ _______ _______ _______ _______

2. Calculate the following as quickly as you can. As before, your time limit is spelled out below, using the same code as before.

(a) $2\frac{1}{2} \times 5 =$

(b) $0 + 2\frac{1}{3} - \frac{1}{3} =$

(c) $\frac{2}{3} \times \frac{3}{1} \times \frac{1}{4} =$

(d) $\frac{1}{3} \times 19 \times 3 =$

(e) $\frac{2}{3}(\frac{3}{2} + 1) =$

(f) $\frac{3}{4} \times \frac{1}{2} \times 26 \times \frac{2}{3} \times 4 =$

(g) $\frac{1}{4} + \frac{3}{5} + \frac{3}{4} =$

(h) $6 \times 2 \times 1 \times \frac{1}{6} =$

_______ _______ _______ _______ _______ _______ _______ _______

EXERCISES: OBJECTIVE NO. B-15

1. Evaluate the following:

(a) $5 + 4 \times 2 =$

(b) $4 - 2 \times 2 =$

(c) $6 + 3 \div 3 =$

(d) $7 \times 6 - 3 =$

(e) $64 \div (7 + 9 - 8) \times 3 =$

(f) $7 \times (5 + 3) \div 9 - 5 =$

(g) $8 + 7 \times (27 \div 3 - 4) =$

(h) $(28 \div 2 - 6) \times (5 + 2) =$

(i) $(7 + 8) - (3 \times 4 \div 2) =$

(j) $12 - 3\,[14 \div (3 + 4)] =$

2. Solve:

(a) $\frac{2}{3} \times \frac{1}{2} \div \frac{1}{6} =$

(b) $\frac{3}{4} \div \frac{1}{2} \times \frac{3}{5} =$

(c) $\frac{4}{5} \times \frac{1}{2} \div \frac{1}{5} \times \frac{3}{4}$

(d) $\frac{5}{7} \div \frac{1}{7} \times \frac{5}{3} \div \frac{1}{5} =$

(e) $\frac{1}{3} \times \frac{1}{4} \div \frac{1}{5} \times \frac{1}{6} \div \frac{1}{7}$

RULES: 1. *Do all work in parentheses.*

2. *Do all multiplications and divisions in order from left to right.*

3. *Do all addition and subtraction in order from left to right.*

3. Solve the following problems and locate the answers on the next page. If you connect the dots for each correct answer in the same order as the problems are numbered, a cartoon will appear. (There are more answers than there are problems).

1. $\frac{1}{2} + \frac{2}{3} \times \frac{1}{4} =$

2. $\frac{3}{4} - \frac{3}{2} \times \frac{1}{3} =$

3. $\frac{4}{5} \div \frac{1}{2} - \frac{3}{4} =$

4. $\frac{2}{5} + \frac{1}{2} \div \frac{4}{3} =$

5. $\frac{1}{3} \times \frac{1}{4} + \frac{4}{5} \div \frac{3}{4} =$

6. $\frac{3}{4} + (\frac{2}{5} + \frac{1}{4}) =$

7. $(\frac{2}{3} - \frac{1}{6}) \times \frac{3}{5} =$

8. $1 - (\frac{1}{2} + \frac{1}{3}) \times \frac{6}{5} =$

9. $\frac{3}{4} - (\frac{3}{5} \times \frac{5}{4}) + \frac{1}{3} =$

10. $(\frac{2}{3} \times \frac{5}{4} - \frac{1}{6}) \div \frac{1}{2} =$

11. $\frac{1}{8} \div \frac{1}{4} \times \frac{5}{6} + \frac{2}{5} =$

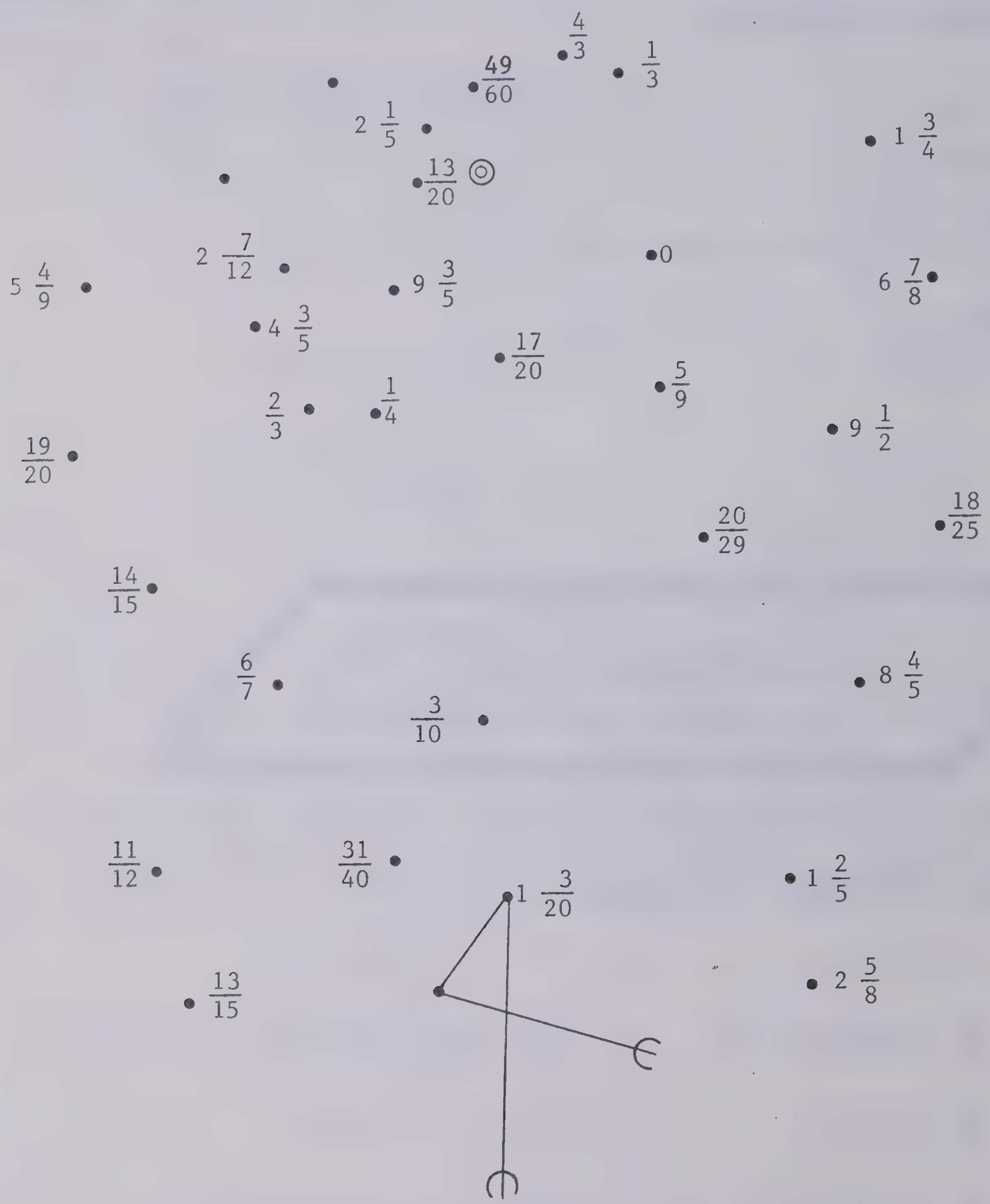
12. $\frac{3}{8} \div (\frac{1}{4} \times \frac{5}{6}) + \frac{2}{5} =$

13. $(\frac{4}{5} - \frac{1}{4}) + \frac{1}{2} \times \frac{1}{5} =$

14. $\frac{7}{16} \div \frac{3}{4} + \frac{6}{7} \times 2\frac{1}{3} =$

15. $5 \div \frac{1}{2} - 6 + \frac{3}{5} =$

16. $6\frac{2}{5} \div (4 \times \frac{1}{2}) \div \frac{1}{3} =$



*4. Place in the required parenthesis and/or brackets to make the following true:

(a) $\frac{1}{2} + \frac{1}{3} \times \frac{6}{5} = 1$

(b) $\frac{1}{2} + \frac{1}{3} - \frac{1}{6} \times \frac{3}{4} = \frac{1}{2}$

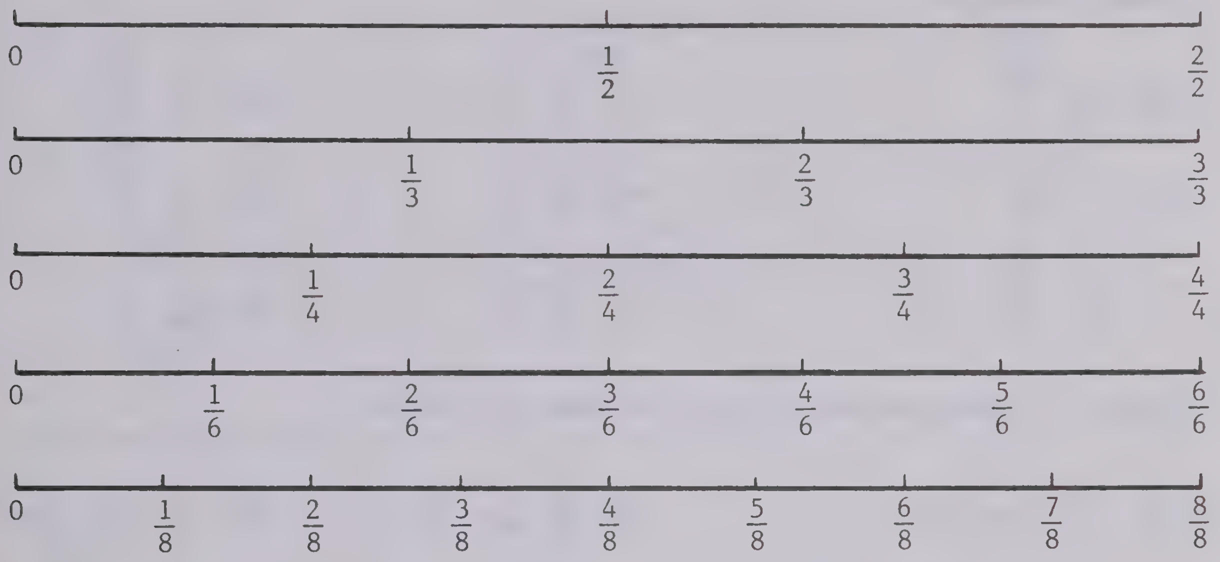
(c) $\frac{1}{2} \times \frac{4}{5} + \frac{1}{5} \div \frac{3}{2} = \frac{1}{3}$

(d) $\frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(e) $\frac{2}{3} - \frac{1}{3} \div \frac{1}{3} \times \frac{1}{5} = \frac{1}{5}$

EXERCISES: OBJECTIVE NO. B-16

1. Using these number lines, indicate whether the following statements are true or false:



(a) $\frac{7}{8} > \frac{5}{8}$ T F

(b) $\frac{3}{6} < \frac{5}{6}$ T F

(c) $\frac{1}{4} = \frac{2}{8}$ T F

(d) $\frac{1}{3} < \frac{2}{3}$ T F

(e) $\frac{2}{3} = \frac{5}{6}$ T F

(f) $\frac{4}{8} = \frac{2}{4}$ T F

(g) $\frac{3}{4} > \frac{2}{3}$ T F

(h) $\frac{3}{4} < \frac{5}{6}$ T F

(i) $\frac{3}{8} < \frac{1}{3}$ T F

(j) $\frac{5}{6} > \frac{7}{8}$ T F

2. Since it is not always practical to construct number lines to order fractions, you can use the Order Property of Rational Numbers.

Use the Order Property to prove if these statements are true or false.

(a) $\overset{3}{\frac{1}{3}} \times \overset{6}{\frac{2}{3}}$ [✓ T] F

(b) $\frac{2}{5} < \frac{4}{5}$ T F

(c) $\frac{8}{4} < \frac{7}{4}$ T F

(d) $\frac{7}{6} < \frac{9}{6}$ T F

(e) $\frac{3}{4} < \frac{5}{6}$ T F

(f) $\frac{4}{6} < \frac{5}{7}$ T F

(g) $\frac{2}{3} < \frac{2}{5}$ T F

(h) $\frac{4}{5} < \frac{4}{6}$ T F

(i) $\frac{3}{7} < \frac{2}{4}$ T F

(j) $\frac{6}{9} < \frac{5}{7}$ T F

3. Place a <, >, or = sign between the following pairs of fractions to make true statements.

(a) $\frac{6}{7} \quad \frac{5}{6}$

(b) $\frac{2}{5} \quad \frac{7}{10}$

(c) $\frac{4}{2} \quad \frac{3}{8}$

(d) $\frac{3}{8} \quad \frac{2}{5}$

(e) $\frac{3}{2} \quad \frac{7}{5}$

(f) $\frac{7}{9} \quad \frac{5}{6}$

(g) $\frac{1}{4} \quad \frac{2}{5}$

(h) $\frac{7}{8} \quad \frac{9}{10}$

(i) $\frac{6}{10} \quad \frac{3}{5}$

4. Order the fractions below from smallest to largest.

(a) $\frac{3}{5}, \frac{1}{2}, \frac{7}{10}$

(b) $\frac{5}{6}, \frac{2}{3}, \frac{3}{4}$

(c) $\frac{8}{9}, \frac{2}{3}, \frac{5}{6}$

(d) $\frac{5}{9}, \frac{4}{7}, \frac{3}{5}$

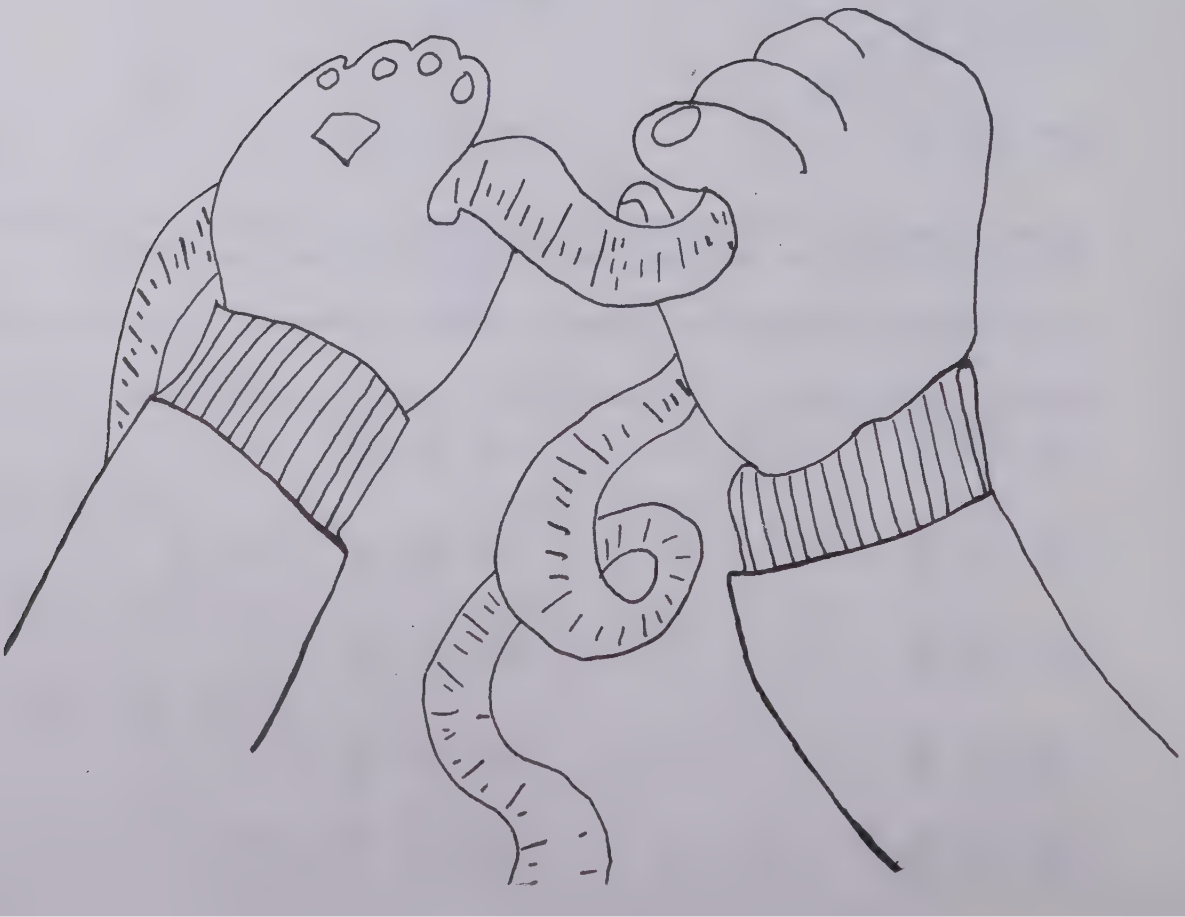
(e) $\frac{7}{8}, \frac{3}{4}, \frac{9}{10}$

(f) $\frac{5}{8}, \frac{4}{7}, \frac{3}{6}$

(g) $\frac{2}{3}, \frac{3}{4}, \frac{2}{5}, \frac{5}{6}$

(h) $\frac{3}{2}, \frac{4}{5}, \frac{5}{4}, \frac{3}{7}$

(i) $\frac{7}{6}, \frac{2}{8}, \frac{5}{9}, \frac{7}{4}$



EXERCISES: OBJECTIVE NO. C-1

1. Write decimals for:

(a) $\frac{9}{10}$

(b) $\frac{37}{100}$

(c) $\frac{254}{1000}$

(d) $\frac{635}{100}$

(e) $\frac{51}{100}$

(f) $17\frac{5}{10}$

(g) $15\frac{9}{10}$

(h) $99\frac{99}{100}$

(i) $3\frac{1}{5}$

(j) $11\frac{6}{10}$

2. Write decimals for:

(a) $\frac{4}{25}$

(b) $\frac{7}{8}$

(c) $\frac{2}{5}$

(d) $\frac{1}{4}$

(e) $\frac{13}{50}$

(f) $\frac{3}{8}$

(g) $\frac{7}{10}$

(h) $\frac{3}{5}$

(i) $\frac{17}{20}$

(j) $\frac{1}{5}$

HINT:

8ths and multiples of 8ths convert to 1000ths.

EXERCISES: OBJECTIVE NO. C-2

1. Complete the chart below.

	TEN THOUSANDS 10 000	THOUSANDS 1 000	HUNDREDS 100	TENS 10	ONES 1	.	TENTHS $\frac{1}{10}$	HUNDREDTHS $\frac{1}{100}$	THOUSANDTHS $\frac{1}{1000}$	TEN-THOUSANDTHS $\frac{1}{10\ 000}$
17.2				1	7	.	2			
28.35										
27.381										
0.273										
273.01										
1 725.235										
1.136										
238.701										
0.017										
200.0015										

2. Write in expanded form.

(a) 357.8
(b) 21.37
(c) 4.392
(d) 69.401
(e) 84.003
(f) 10.01
(g) 2.075
(h) 82.6
(i) 77.707 01
(j) 0.000 03

To expand a number multiply the face value of each digit (i.e. what you see) by its place value and join the products with '+' signs.

1. Write decimal numerals for each of the following:
The first one has been done for you.

(a) $(1 \times 1) + (3 \times \frac{1}{10}) + (4 \times \frac{1}{100}) = 1.34$

(b) $(0 \times 1) + (7 \times \frac{1}{10}) + (8 \times \frac{1}{100})$

(c) $(7 \times 1) + (6 \times \frac{1}{10}) + (8 \times \frac{1}{100}) + (9 \times \frac{1}{1000})$

(d) $(1 \times 10) + (1 \times 1) + (0 \times \frac{1}{10}) + (1 \times \frac{1}{100}) + (6 \times \frac{1}{1000})$

(e) $(2 \times 10) + (1 \times 1) + (0 \times \frac{1}{10}) + (0 \times \frac{1}{100}) + (1 \times \frac{1}{1000})$

(f) $(0 \times 1) + (3 \times \frac{1}{10}) + (0 \times \frac{1}{100}) + (4 \times \frac{1}{1000})$

(g) $(2 \times 1) + (3 \times \frac{1}{10})$

(h) $(8 \times 10) + (3 \times 1) + (4 \times \frac{1}{10}) + (3 \times \frac{1}{100})$

(i) $(0 \times 1) + (2 \times \frac{1}{10}) + (9 \times \frac{1}{100})$

(j) $(0 \times 1) + (4 \times \frac{1}{10}) + (1 \times \frac{1}{100}) + (3 \times \frac{1}{1000}) + (6 \times \frac{1}{10\ 000})$

(k) $(2 \times 10) + (0 \times 1) + (0 \times \frac{1}{10}) + (1 \times \frac{1}{100})$

(1) $(0 \times 1) + (0 \times \frac{1}{10}) + (9 \times \frac{1}{100})$

(m) $(0 \times 1) + (1 \times \frac{1}{10}) + (0 \times \frac{1}{100}) + (3 \times \frac{1}{1000})$

(n) $(4 \times 1) + (3 \times \frac{1}{10})$

(0) $(6 \times 1) + (0 \times \frac{1}{10}) + (0 \times \frac{1}{100}) + (7 \times \frac{1}{1000})$

(p) $(0 \times 1) + (1 \times \frac{1}{10})$

(q) $(0 \times 1) + (0 \times \frac{1}{10}) + (1 \times \frac{1}{100}) + (2 \times \frac{1}{1000}) + (0 \times \frac{1}{10\ 000})$
$+ (4 \times \frac{1}{100\ 000})$

(r) $(0 \times 1) + (2 \times \frac{1}{10}) + (7 \times \frac{1}{100})$

(s) $(1 \times 1) + (4 \times \frac{1}{10})$

(t) $(3 \times 10) + (0 \times 1) + (0 \times \frac{1}{10}) + (9 \times \frac{1}{100})$

2. Write decimal numerals for each of the following:

   HINT: *Use zeroes for place holders if necessary.*

   (a) $(8 \times 100) + (7 \times 10) + (9 \times 1) + (8 \times \frac{1}{10}) + (9 \times \frac{1}{100})$

   (b) $(7 \times 1) + (3 \times \frac{1}{10})$

   (c) $(2 \times 1) + (3 \times \frac{1}{10}) + (8 \times \frac{1}{100})$

   (d) $(2 \times \frac{1}{10}) + (7 \times \frac{1}{1000})$

   (e) $(6 \times 1) + (4 \times \frac{1}{100})$

   (f) $(7 \times \frac{1}{1000})$

   (g) $(4 \times 10) + (3 \times \frac{1}{100})$

   (h) $(2 \times \frac{1}{10}) + (3 \times \frac{1}{100}) + (4 \times \frac{1}{1000})$

   (i) $(1 \times 10) + (5 \times \frac{1}{10}) + (5 \times \frac{1}{100}) + (7 \times \frac{1}{1000})$

   (j) $(9 \times \frac{1}{10})$

EXERCISES: OBJECTIVE NO. C-4

1. Make these statements true by using >, <, =.

(a) 0.380 0.038

(b) 1.14 1.4

(c) 0.053 0.0530

(d) 0.0017 0.000 17

(e) 0.3245 0.325

(f) 0.7768 0.776 09

(g) 4.805 4.8051

(h) 6.62 6.58

(i) 3.005 3.105

(j) 0.1043 0.010 43

2. List the numbers in order from least to greatest:

(a) 0.05, 0.1, 0.09

(b) 0.08, 0.06, 0.11

(c) 0.47, 0.43, 0.42

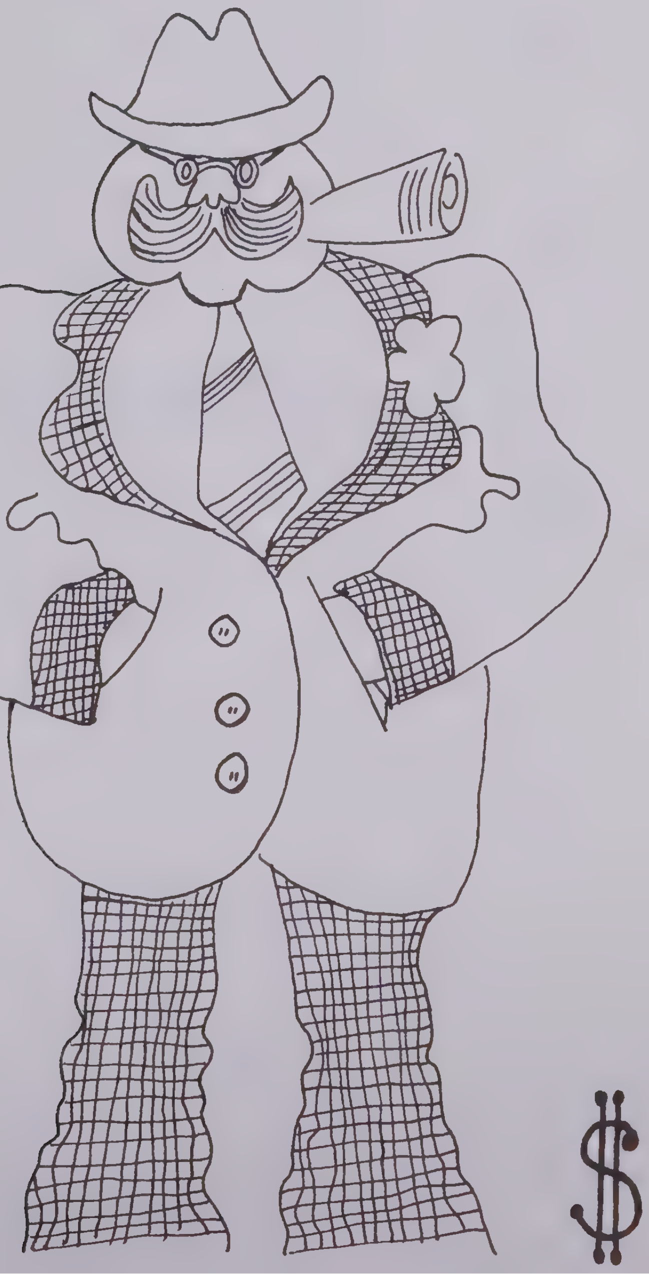
(d) 0.092, 0.089, 0.088

(e) 4.04, 0.44, 0.044, 0.404

(f) 0.56, 0.056, 5.6, 0.5060

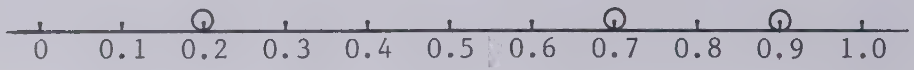
(g) 9.2, 0.92, 0.902, 0.092

(h) 10.1, 0.0101, 0.101, 1.01

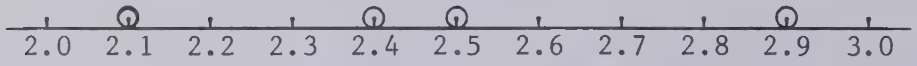


EXAMPLES:

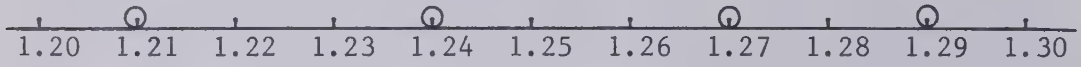
(a) $\{0.2,\ \ 0.7,\ \ 0.9\}$



(b) $\{2.4,\ \ 2.1,\ \ 2.9,\ \ 2.5\}$

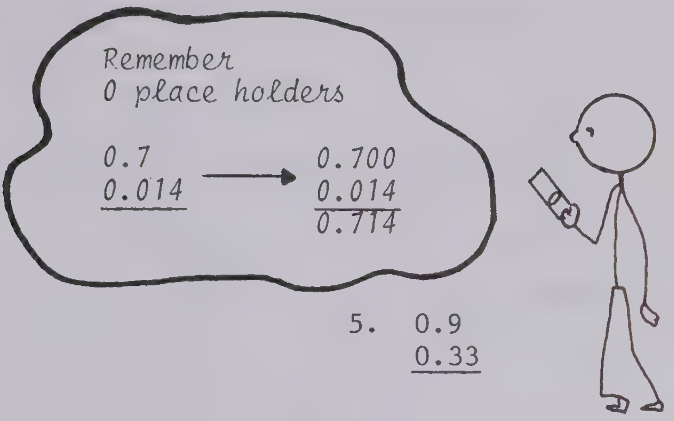


(c) $\{1.24,\ \ 1.27,\ \ 1.21,\ \ 1.29\}$



Draw number lines, and graph the following sets:

1. $\{0.3,\ \ 0.4,\ \ 0.5\}$
2. $\{0.10,\ \ 0.15,\ \ 0.20\}$
3. $\{1.7,\ \ 1.5,\ \ 1.3\}$
4. $\{3.1,\ \ 3.3,\ \ 3.5,\ \ 3.9\}$
5. $\{0.06,\ \ 0.08,\ \ 0.09\}$



I. Add:

1. $\begin{array}{l} 0.2 \\ \underline{0.6} \end{array}$

2. $\begin{array}{l} 0.37 \\ \underline{0.91} \end{array}$

3. $\begin{array}{l} 2.8 \\ \underline{6.3} \end{array}$

4. $\begin{array}{l} 0.5 \\ \underline{0.22} \end{array}$

5. $\begin{array}{l} 0.9 \\ \underline{0.33} \end{array}$

6. $\begin{array}{l} 2.1 \\ \underline{3.0} \end{array}$

7. $\begin{array}{l} 3.8 \\ \underline{7.14} \end{array}$

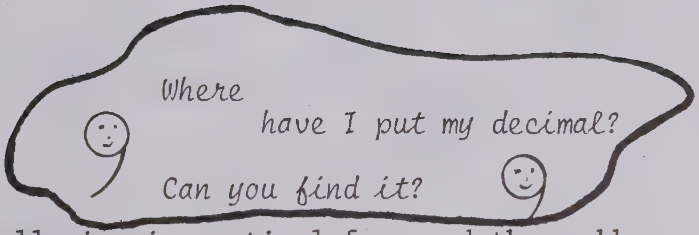
8. $\begin{array}{l} 0.9 \\ \underline{1.35} \end{array}$

9. $\begin{array}{l} 1.07 \\ \underline{0.98} \end{array}$

10. $\begin{array}{l} 0.63 \\ \underline{6.214} \end{array}$

11. $\begin{array}{l} 5.1 \\ \underline{6.2} \end{array}$

12. $\begin{array}{l} 7.1345 \\ \underline{0.0123} \end{array}$


Where
have I put my decimal?
Can you find it?

Rewrite the following in vertical form and then add.

13. 0.2 + 0.57 =
14. 7 + 0.8 =
15. 3.87 + 0.6 =
16. 4.9 + 0.3 =
17. 7.09 + 0.93 + 2 =
18. 2.3 + 0.99 =
19. 0.1 + 0.2 + .03 =
20. 2.1 + 3.2 + 4.3 =
21. 3 + 2.6 + 3.1 =
22. 8 + 24 + 7.1 =

II. Subtract:

1. $\begin{array}{l} 3.1 \\ \underline{1.7} \end{array}$

2. $\begin{array}{l} 5.41 \\ \underline{2.89} \end{array}$

3. $\begin{array}{l} 6.5 \\ \underline{3.91} \end{array}$

4. $\begin{array}{l} 7.61 \\ \underline{1.3} \end{array}$

5. $\begin{array}{l} 6.1 \\ \underline{2.63} \end{array}$

6. $\begin{array}{l} 9. \\ \underline{6.31} \end{array}$

7. 5.5
   1.83

8. 12.61
   9.27

9. 15.11
   7.

10. 23.3
    19.87

11. 8.1
    4.3

12. 4.81
    2.

Rewrite the following in vertical form and then subtract.

13. 0.6 - 0.29 =
14. 0.73 - 0.63 =
15. 19 - 3.97 =
16. 1.912 - 1 =
17. 4.73 - 2.1 =
18. 7 - 1.1 =
19. 1.1 - 0.8 =
20. 4.12 - 1.11 =
21. 17.34 - 2.86 =
22. 31.8 - 12 =

III. Fun time:

1		▨	2		▨	3
	▨	4		▨	5	
▨	6		▨	7		▨
8		▨	9		▨	10
▨	11			▨	12	

YOU DO NOT HAVE TO PUT IN DECIMAL POINTS.

ACROSS

1. Change to decimal $\frac{73}{100}$
2. 5.3 + 17.7 + 2
3. 3 - 2.6
4. 0.1 = $\frac{?}{100}$
5. 15.3 - 14.98
6. Write as a decimal $2\frac{1}{10}$
7. 4.5 = $\frac{?}{10}$
8. 5.1 = $\frac{51}{?}$
9. 0.6 + 1.6
10. 2 - 1.9
11. $1\frac{5}{100}$ as a decimal
12. 5.2 - 4.98

DOWN

1. 0.7 = $\frac{\quad}{100}$
2. 1.3 + 0.7
3. Which is greater, 0.36 or 0.42?
4. 8.3 + 2.7
5. 6 - 2.5
6. $2\frac{1}{100}$ in decimal form.
7. 2.3 + 1.8 + 0.1
9. 5.2 - 4.95
10. 5.1 + 2.5 + 4.4

Round off:

1. 13.41 (tenth)
2. 73.81 (tenth)
3. 12.617 (hundredth)
4. 9.890 (hundredth)
5. 9.995 (hundredth)
6. 64.0255 (thousandth)
7. 43.6 (ones)
8. 9.8765 (hundredth)
9. 32.146 (tenth)
10. 1.005 106 281 (thousandth)
11. Round off the following number to:

    (a) tenth (b) hundredths

    (c) thousandths

    14.8187

EXERCISES: OBJECTIVE NO. C-8

1. Multiply and show how many places the decimal point moves. The first one is done for you.

   1) $25 \times 10 = 250.0$
   2) $15.6 \times 100 =$
   3) $6.2 \times 10 =$
   4) $3.24 \times 10 =$
   5) $5.65 \times 10 =$
   6) $2.86 \times 100 =$
   7) $9.5 \times 1000 =$
   8) $0.86 \times 10 =$
   9) $0.897 \times 100 =$
   10) $5.24 \times 1000 =$
   11) $0.003 \times 10 =$
   12) $0.003 \times 100 =$

2. Calculate the answers: The first one is done for you.

   1) $16. \div 100 = 0.16$
   2) $16. \div 1000 =$
   3) $12.34 \div 10 =$
   4) $\frac{12.34}{100} =$
   5) $\frac{184.3}{1000} =$
   6) $\frac{5673.4}{100} =$
   7) $\frac{1000.01}{1000} =$
   8) $\frac{1000.01}{10} =$
   9) $158.5 \div 10 =$
   10) $158.5 \div 1000 =$
   11) $158.5 \div 10\,000 =$
   12) $\frac{0.15}{100} =$

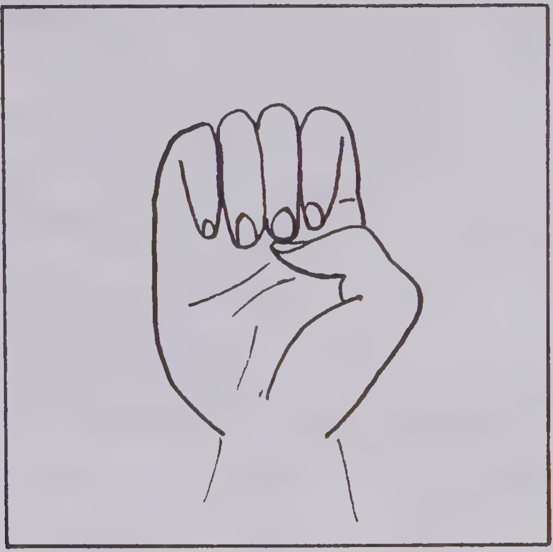
3.

FIND THE TITLE OF THE PICTURE

FIRST: Work out any problem below.

SECOND: Find the answer under the picture at the right.

THIRD: Place letter of question over answer.



H. 18 ÷ 10 =

E. 87.5 ÷ 10 =

S. 0.45 x 100 =

O. 3.14 ÷ 1000 =

T. 2.4 x 100 =

R. 9.7 ÷ 10 =

T. 0.625 x 10 =

W. 0.14 x 1000 =

E. 6.04 x 100 =

T. 0.375 x 100 =

P. 0.045 x 100 =

O. 25.4 ÷ 1000 =

N. 19.5 ÷ 10 =

E. 25.6 ÷ 100 =

TITLE:

4.5	0.003 14	140	604	0.97
240	0.0254	6.25	1.8	0.256
37.5	8.75	1.95	45	

REMEMBER!

A. *In multiplication the decimal moves to the right.*

A ➡

B. *In division the decimal moves to the left.*

⬅ B

1. Place the decimal point in the product. The first one is done for you.

(a) 0.2 x 4.1 = 0.82 two decimal places
(b) 0.3 x 0.04 = 12
(c) 0.5 x 0.5 = 25
(d) 0.15 x 0.3 = 45
(e) 3 x 0.53 = 159
(f) 8.1 x 0.01 = 81
(g) 9 x 0.6 = 54
(h) 8 x 0.07 = 56
(i) 23 x 0.04 = 92
(j) 0.7 x 0.04 = 28

> *REMEMBER!!*
> *Multiply ordinarily*
> *and then put in your decimal place.*

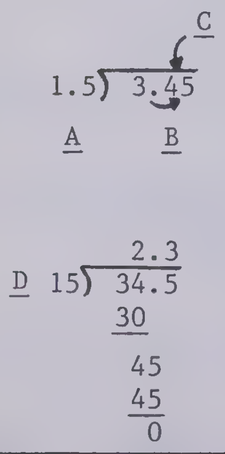
2. Find the following products.

(a) $\begin{array}{r}3\\ \underline{0.4}\end{array}$ (b) $\begin{array}{r}12\\ \underline{0.5}\end{array}$ (c) $\begin{array}{r}3.6\\ \underline{0.3}\end{array}$ (d) $\begin{array}{r}4.8\\ \underline{3.9}\end{array}$

(e) 2 x 0.6 =
(f) 10 x 0.8 =
(g) 0.2 x 0.5 =
(h) 0.03 x 0.8 =
(i) 1.3 x 0.4 =
(j) 9 x 0.3 =
(k) 3.3 x 0.02 =
(1) 12 x 0.003 =
(m) 60 x 0.5 =
(n) 0.0001 x 0.01 =

3. Divide:

Steps to Follow:



A. *Move the decimal in the divisor to the right end, if necessary.*

B. *Move the decimal in the dividend as many places to the right as you did in the divisor.*

C. *Place the decimal on top directly above the decimal in the dividend.*

D. *Divide as usual.*

3. (a) 24.3 ÷ 0.3
   (b) 1.75 ÷ 0.5
   (c) 5.4 ÷ 0.03
   (d) 3.15 ÷ 0.005
   (e) 10.584 ÷ 2.1
   (f) 0.384 ÷ 0.4
   (g) 0.297 ÷ 0.3
   (h) 0.9936 ÷ 0.18
   (i) 0.7626 ÷ 1.23
   (j) 0.65 ÷ 2.5
   (k) 564 ÷ 1.2

4. Do the following:

   (a) 1.069 + 673.527 + 0.088 27 =
   (b) 51.273 - 49.08 =
   (c) 6.08 x 0.23 =
   (d) 8740.08 ÷ 79.6 =
   (e) 0.25 x 25
   (f) 64.8 ÷ 18
   (g) 72.13 + 0.869 + 14.0 + 1.004 =
   (h) 1 - 0.999 43
   (i) 5.018 ÷ 26
   (j) 6.8 + 3.798 + 678.1 + 0.0753 =
   (k) 4.18 x 0.006 =
   (l) 50 - 5.607 =

5. The words in parenthesis tell how you are to round off the quotient.

   (a) 21.4 ÷ 9 (ones)
   (b) 9.54 ÷ 30 (ones)
   (c) 43.1 ÷ 7 (ones)
   (d) 19.7 ÷ 0.6 (ones)
   (e) 1.37 ÷ 0.04 (ones)
   (f) 4.9 ÷ 3 (tenths)
   (g) 8.11 ÷ 4 (tenths)
   (h) 0.137 ÷ 0.09 (tenths)
   (i) 6.8 ÷ 7 (tenths)
   (j) 11.3 ÷ 0.8 (tenths)
   (k) 6.77 ÷ 3 (hundredths)
   (l) 9.12 ÷ 0.7 (hundredths)
   (m) 9.8 ÷ 1.2 (hundredths)
   (n) 9.17 ÷ 4 (hundredths)
   (o) 8.09 ÷ 0.6 (hundredths)

6. Rewrite in vertical form and multiply.

   I. (a) 3.75 x 1.13
   (d) 3.7 x 0.02
   (g) 92.47 x 8.2
   (j) 6.214 x 3.5
   (m) 8.4 x 9.15
   (p) 650 x 12.7
   (s) 22.04 x 8.2
   (b) 0.345 x 0.2
   (e) 0.0056 x 0.000 25
   (h) 17.47 x 2.351
   (k) 325.1 x 0.45
   (n) 16.2 x 25
   (q) 1274 x 0.6
   (t) 90.71 x 12.3
   (c) 9.8 x 0.0024
   (f) 1.274 x 0.713
   (i) 26 x 2.41
   (l) 19.37 x 0.124
   (o) 9.84 x 241
   (r) 1.005 x 8
   (u) 75.146 x 0.006

   II. (a) 1.284
   x3.16

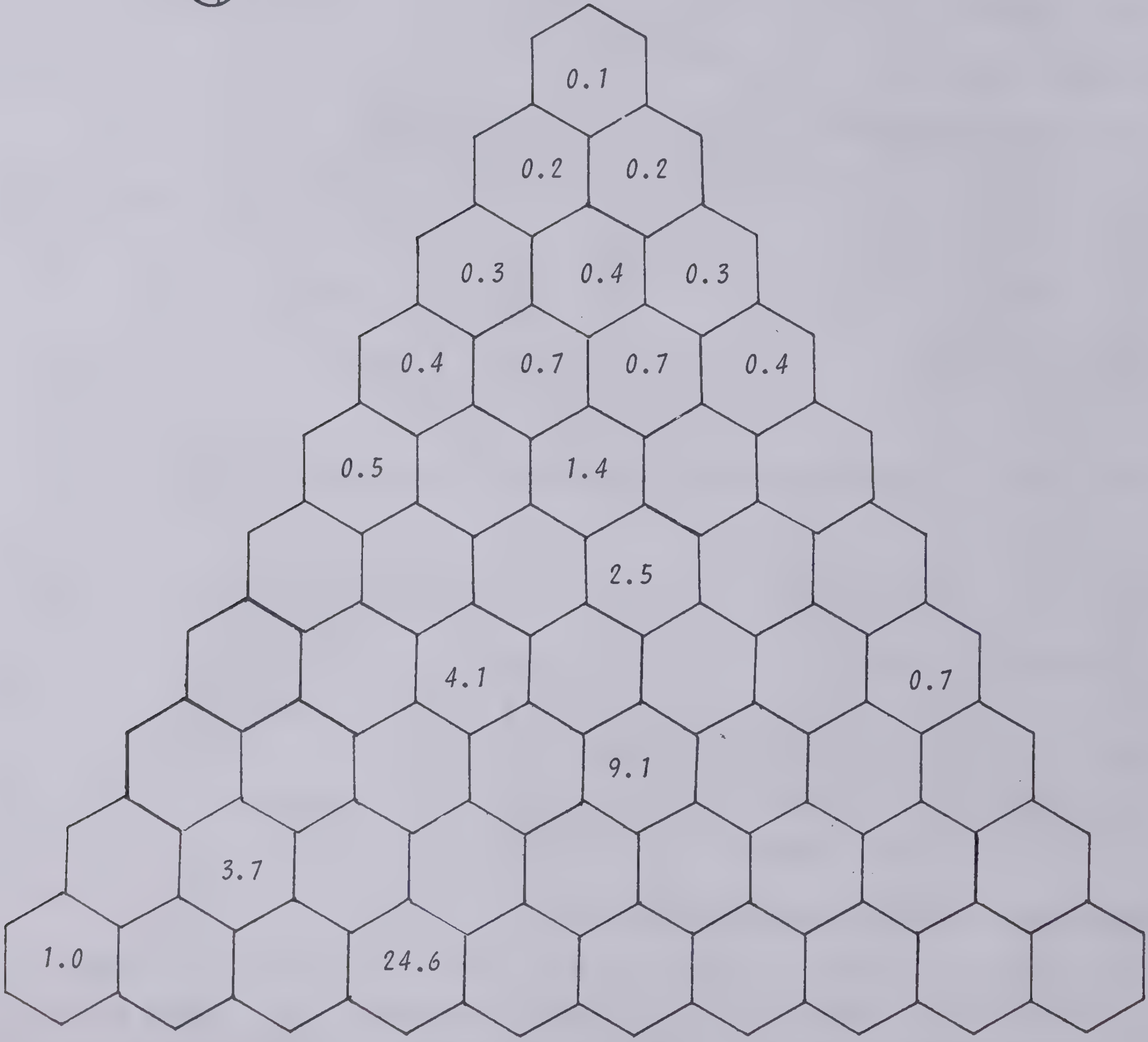
   (b) 8.21
   x0.614

   (c) 3.2
   x8.64

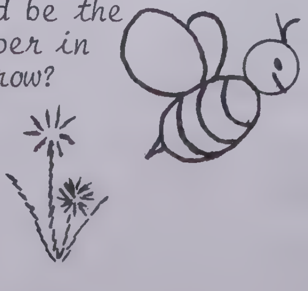
   (d) 0.2
   x6.47

   (e) 3.26
   8.54

7. *Find a pattern and then complete the figure.*



If this continued what would be the first number in the 30th row?



What would be the first number in the 100th row?

1. Convert these fractions to decimals.

(a) $\frac{4}{5}$ (b) $\frac{3}{8}$ (c) $\frac{3}{4}$ (d) $\frac{9}{20}$

(e) $\frac{5}{8}$ (f) $\frac{13}{40}$ (g) $\frac{11}{16}$ (h) $\frac{7}{16}$

(i) $\frac{3}{80}$ (j) $\frac{17}{80}$ (k) $\frac{1}{40}$ (l) $\frac{5}{16}$

Remember

$4 \div 5 = \frac{4}{5} = 0.8$

2. Change the following fractions to repeating decimals by dividing the numerator by the denominator.

(a) $\frac{1}{3}$ (b) $\frac{3}{11}$ (c) $\frac{4}{15}$ (d) $\frac{7}{36}$

(e) $\frac{5}{6}$ (f) $\frac{1}{7}$ (g) $\frac{2}{3}$ (h) $\frac{7}{3}$

I. Write the following decimals as fractions.

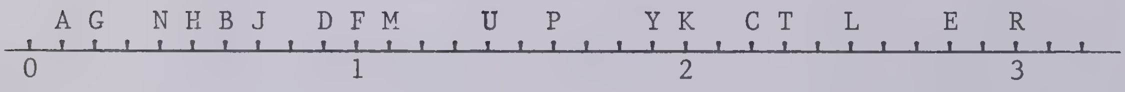
(a) 3.16
(b) 4.36
(c) 0.165
(d) 0.01
(e) 20.3
(f) 7.8
(g) 12.98
(h) 12.3
(i) 1.05
(j) 5.005
(k) 8.08
(l) 5.4
(m) 0.001
(n) 2.875
(o) 23.6
(p) 19.684

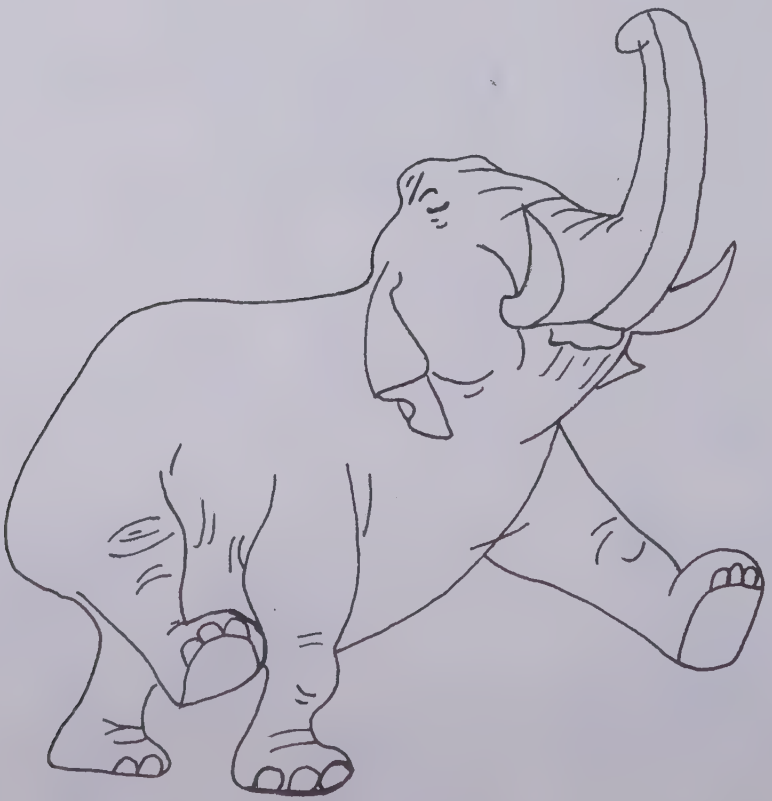
II. Write the answer to each of the following questions in decimal form. Locate the answers on the number line and use the letters associated with the answers to answer the riddle.

How do you move after an elephant sits on you?

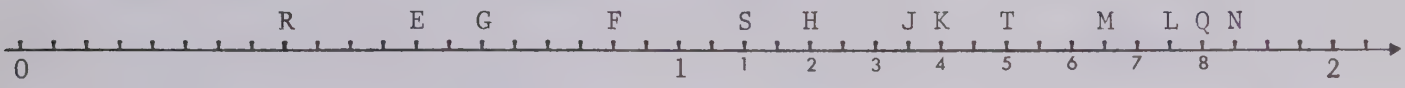
___ ___   ___ ___ ___ ___ ___ ___ ___ ___ ___

(1) $\frac{3}{5}$ =
(2) 2 - 0.1 =
(3) 2.74 - 2.64 =
(4) 0.5 + 0.6 =
(5) 1.2 ÷ 2 =
(6) 7 x 0.2
(7) $2\frac{1}{2}$ =
(8) $\frac{1}{2} \times \frac{1}{5}$ =
(9) 2 x 0.1 + 0.2
(10) 1.5 + 0.7 =
(11) $7 \times \frac{2}{5}$ =





Use the number line below to answer questions 1 to 6.



1. The decimal 0.7 is associated with letter
2. The decimal fraction 1.4 is associated with letter
3. The decimal fraction 1.85 is associated with letter
4. The decimal fraction associated with letter 'R' is

   (a) 4/10 (b) 0.4 (c) 0.5 (d) 5/10
5. The decimal fraction associated with letter 'L' is

   (a) 1.85 (b) 1.70 (c) 1.75 (d) 1.80
6. The decimal fraction associated with letter 'M' is

   (a) 1.70 (b) 1.65 (c) 1.60 (d) 1.55
7. 3.542 written in expanded notation would be

   (a) $3(1000) + 5(100) + 4(10) + 2(1)$

   (b) $3(10) + 5(1) + 4(\frac{1}{10}) + 2(\frac{1}{100})$

   (c) $3(1) + 5(1) + 3(\frac{1}{10}) + 2(\frac{1}{100})$

   (d) $3(1) + 5(\frac{1}{10}) + 4(\frac{1}{100}) + 2(\frac{1}{1000})$
8. Which is the expanded form for 50.802?

   (a) $5(10) + 1(8) + 1(2)$

   (b) $5(10) + 8(10) + 2(1000)$

   (c) $5(10) + 8(\frac{1}{10}) + 2(\frac{1}{100})$

   (d) $5(10) + 0(1) + 8(\frac{1}{10}) + 0(\frac{1}{100}) + 2(\frac{1}{1000})$
9. What is an expanded form for 0.505 05 ?

   (a) $5(10) + 5(100) + 5(1000)$

   (b) $5(\frac{1}{10}) + 5(\frac{1}{1000}) + 5(\frac{1}{100\ 000})$

   (c) $5(10) + 5(1000) + 5(\ 100\ 000)$

   (d) $5(\frac{5}{1000}) + 5(\frac{1}{10\ 000}) + 5(\frac{1}{100\ 000})$
10. Which is the decimal for $5(100) + 3(10) + 5(\frac{1}{10}) + 4(\frac{1}{100})$?

    (a) 5354 (b) 53.050 04 (c) 530.54 (d) 530 + 54

11. Which is the decimal for $8(100) + 0(10) + 7(1) + 0(\frac{1}{10}) + 6(\frac{1}{100}) + 0(\frac{1}{1000}) + 5(\frac{1}{10\ 000})$?

(a) 87.65 (b) 807.065 (c) 87.6005 (d) 807.0605

12. Which is the decimal for three hundred and five tenths?

(a) 305.0 (b) 300.5 (c) 305.5 (d) 300.05

13. Which is the decimal for 7 tens, 5 tenths, and 15 hundredths?

(a) 70.515 (b) 7.515 (c) 70.501 500 (d) 70.65

14. $18.4 + 5.7 = n$

(a) 241 (b) 23.1 (c) 18.97 (d) 24.1

15. $204.35 + 0.058 = n$

(a) 204.408 (b) 2.044 08 (c) 262.35 (d) .262 35

16. $3.05 + 40.5 + 205.69 = n$

(a) 212.79 (b) 248.24 (c) 249.24 (d) 915.69

17. $17.4 - 13.8 = n$

(a) 3.6 (b) 4.2 (c) 4.4 (d) 4.6

18. $7.64 - 7.467 = n$

(a) 0.173 (b) 0.183 (c) 0.227 (d) 0.287

19. $1.438 + 8.425 = n$

(a) 7.987 (b) 6.987 (c) 7.097 (d) 9.863

20. $84 \times 0.047 =$

(a) 0.039 48 (b) 0.3948 (c) 3.948 (d) 39.48

21. $0.068 \times 0.05 = n$

(a) 0.0034 (b) 0.000 34 (c) 0.034 (d) 0.34

22. $5.4 \times 6.007 = k$

(a) 5.4063 (b) 3.2778 (c) 32.4378 (d) 32 437.8

23. $3.4 \div 0.02 = n$

(a) 17 (b) 1.7 (c) 170 (d) 0.170

24. $5.76 \div 0.08 = n$

(a) 72 (b) 720 (c) 0.72 (d) 7.2

25. $1.005 \div 2.01 = n$

(a) 0.4 (b) 0.5 (c) 4.6 (d) 4.7

26. 0.9304 ÷ 0.8 = h

(a) 1.162 (b) 1.163 (c) 0.116 (d) 0.117

27. 8.46 x 100 = k

(a) 84 (b) 840 (c) 846 (d) 0.0846

28. 64.3 x 100 000 = k

(a) 64 300 000. (b) 64 300. (c) 6 430 000. (d) 643 105.

29. 74.3 ÷ 1000 = k

(a) 74 300. (b) 0.000 743 (c) 0.743 (d) 0.0743

30. 8.45 ÷ 100 000 = k

(a) 845 000. (b) 0.008 45 (c) 0.000 084 5 (d) 0.000 845

31. What is a decimal for $8\frac{7}{100}$?

(a) 8.7 (b) 8.07 (c) 0.87 (d) 8.007

32. What is a decimal for $\frac{49}{10}$?

(a) 0.49 (b) 0.049 (c) 4.9 (d) 49.0

33. What is a decimal for $\frac{17}{20}$?

(a) 0.17 (b) 0.68 (c) 0.085 (d) 0.85

34. What is a fractional numeral for 0.008?

(a) $\frac{8}{125}$ (b) $\frac{1}{1000}$ (c) $\frac{1}{125}$ (d) $\frac{8}{1250}$

35. Which is the fractional numeral for 0.0807?

(a) $\frac{807}{1000}$ (b) $\frac{807}{10\ 000}$ (c) $\frac{87}{1000}$ (d) $\frac{807}{100}$

36. Which is a fractional numeral for 24.7?

(a) $\frac{247}{1000}$ (b) $\frac{247}{10\ 000}$ (c) $\frac{247}{10}$ (d) $\frac{247}{100}$

37. Which is less than 0.0707?

(a) 0.7007 (b) 0.070 07 (c) 0.08 (d) 0.077

38. 6.52 ___ 6.5028

(a) > (b) < (c) =

39. What is 16.5934 rounded off to thousandths?

(a) 16.595 (b) 16.594 (c) 16.59 (d) 16.593

40. What is a decimal for $\frac{1}{3}$?

(a) 0.33 (b) $0.\overline{3}$ (c) 0.03 (d) 0.333 33

EXERCISES: OBJECTIVE NO. C-12

1. Write the correct number in the correct position.

(a) $0.7 \times 0.9 = \_\_\_(\_\_\_)$ (b) $1.6 \times 4.2 =$

(c) $2.4 \times 0.9 =$ (d) $0.05(0.062) =$

(e) $0.56(0.009) =$

2. Place each number in the correct position.

(a) $\frac{0.5}{0.4} = \_\_\_ \div \_\_\_ = \_\_\_\overline{)\_\_\_}$ (b) $\frac{1.2}{5}$

(c) $\frac{0.05}{0.1} =$ (d) $\frac{0.092}{0.02} =$

(e) $\frac{12.56}{0.2} =$

3. MATCHING - Place the letter of the expression in column 'B' in the appropriate blank beside column 'A'.

COLUMN A		COLUMN B
1. $5y$	_____	A. $\frac{16}{0.4}$
2. $5(0.8)$	_____	B. $3 \div 0.7$
3. $1 \div 0.7$	_____	C. $25(1.5)$
4. 1.2×0.4	_____	D. $\frac{0.48}{3.6}$
5. $16 \div 0.4$	_____	E. $0.4(1.2)$
6. $\frac{3}{0.7}$	_____	F. $(5)(y)$
7. 0.4×0.5	_____	G. $5(3y)$
8. 25×1.5	_____	H. $0.7\overline{)1}$
9. $5(3y)$	_____	I. $(0.4)(0.5)$
10. $3.6\overline{)0.48}$	_____	J. 5×0.8

4. Write the following statements in any other way.

(a) $0.5(0.6)$ (b) $0.5 \div 0.6$ (c) 0.5×6 (d) $0.6\overline{)5}$

(e) $0.3 \div y$ (f) $y \div 0.3$ (g) $0.3y$ (h) $\frac{0.4}{y}$

(i) $\frac{y}{0.4}$ (j) $0.4(y)$ (k) $y(0.4)$

EXERCISES: OBJECTIVE NO. C-13

1. Evaluate each variable expression. The replacement set for "x" is $\left\{0.3,\ 1.4,\ 0.325\right\}$

   (a) $y + 7.5$ (b) $5(y)$ (c) $3(y) - 0.51$ (d) $75.3 - 10(y)$

2. Evaluate each expression given the value of "a" is $\frac{3}{5}$ and the value of "b" is $\frac{3}{4}$.

   (a) $5a + 2$ (b) $2a - 1$ (c) $3b + 2\frac{1}{2}$ (d) $2a + 3\frac{2}{5}$

3. (a) Replace "a" by 0.09 in: $0.3 + a + 2a$

   (b) Replace "b" by 5.7 in: $6b - 0.53$

   (c) Replace "c" by 0.36 in: $c + c - 0.25$

   (d) Replace "y" by $\frac{4}{5}$ in: $5y + y$

   (e) Replace "m" by 0.105 in: $15m - 0.59 \times 2$

4. Complete the following chart:

	Expression	Replace "a" by	Replacement	Value
(a)	$15a$	$\frac{2}{3}$	$15 \times \frac{2}{3}$	= 10
(b)	$3 + a$	$12\frac{3}{5}$		
(c)	$(a)(2.6)$	0.23		
(d)	$3.5a - 15.658$	12.3		
(e)	$a + 12.67 + a$	5.9		
(f)	$\frac{3}{4}a + \frac{6}{7}$	$\frac{4}{7}$		

5. (a) Evaluate $(15b + 2c)$ when $b = 2.4$ and $c = 0.5$

   (b) Evalute $(6b - c)$ when $b = 1\frac{5}{6}$ and $c = \frac{1}{4}$

*6. Evaluate the following expression:

   $(3c + .5b) - (0.01c + 1.2b)$ when $c = 4.5$ and $b = 0.3$

EXERCISES:

1. Solve the following:

EXAMPLE: $y + 0.77 = 2.5$

$$y + 0.77 - 0.77 = 2.5 - 0.77$$
$$y = 2.5 - 0.77$$
$$y = 1.73$$

a) $y + 0.5 = 1.5$

b) $0.3 + y = 4.1$

c) $n + 0.25 = 1.75$

d) $0.31 + n = 7.4$

e) $0.328 + y = 0.328$

f) $y + \frac{1}{4} = 2\frac{1}{2}$

g) $\frac{2}{3} + y = 6\frac{1}{3}$

h) $y + 1\frac{1}{5} = 7\frac{2}{5}$

2. Solve the following:

EXAMPLE: $y - 1.7 = 2$

$$y - 1.7 + 1.7 = 2 + 1.7$$
$$y = 3.7$$

a) $a - 0.6 = 0.12$

b) $a - 0.18 = 0.36$

c) $a - 2.1 = 9.1$

d) $a - 0.126 = 3.24$

3. Solve the following:

EXAMPLE: $0.3y = 2.7$

$$\frac{0.3y}{0.3} = \frac{2.7}{0.3}$$
$$y = \frac{2.7}{0.3}$$
$$y = 9$$

a) $0.2y = 0.4$

b) $n(0.06) = 0.9$

c) $0.5y = 1$

d) $0.25r = 1.25$

e) $y(0.006) = 0.06$

f) $\frac{2}{3}y = 4$

g) $y \times \frac{3}{4} = 2\frac{1}{2}$

h) $1\frac{1}{2}y = 1\frac{1}{2}$

4. Solve the following:

EXAMPLE: $y \div 0.15 = 0.3$

$$\frac{y}{0.15} \times 0.15 = 0.3 \times 0.15$$
$$y = 0.3 \times 0.15$$
$$y = 0.045$$

a) $y \div 0.2 = 0.3$

b) $\frac{y}{1.5} = 2$

c) $\frac{y}{6.66} = 2$

d) $y \div 3 = 0.33$

e) $y \div 12 = 0.3$

f) $\frac{y}{0.01} = 0.1$

g) $y \div \frac{1}{2} = \frac{1}{4}$

5. Solve the following:

EXAMPLE: $6y + 0.4 = 14.8$

$$6y + 0.4 - 0.4 = 14.8 - 0.4$$

$$6y = 14.8 - 0.4$$

$$6y = 14.4$$

$$\frac{6y}{6} = \frac{14.4}{6}$$

$$y = \frac{14.4}{6}$$

$$y = 2.4$$

(a) $0.3y + 0.4 = 0.4$

(b) $0.5y + 0.25 = 0.75$

(c) $0.2y + 0.2 = 0.4$

(d) $0.75y + 1.25 = 4.25$

(e) $0.3y + 0.03 = 3$

(f) $\frac{1}{2}y + \frac{1}{5}y = \frac{4}{5}$

(g) $1\frac{1}{4}y + 1\frac{1}{2} = 4$

6. Solve the following:

EXAMPLE: $1.5y + .15y = 8.25$

$$(1.5 + .15)y = 8.25$$

$$\frac{(1.5 + .15)y}{(1.5 + .15)} = \frac{8.25}{(1.5 + .15)}$$

$$y = \frac{8.25}{(1.65)}$$

$$y = 5$$

(a) $0.2y + 0.4y = 6$

(b) $0.25y + 0.75y = 2.5$

(c) $0.3n + 0.25n = 5.5$

(d) $0.48r + 0.02r = 5.05$

(e) $1.2y + 3.3y = 9$

(f) $\frac{1}{2}y + \frac{1}{4}y = 3$

(g) $1\frac{1}{5}y + \frac{2}{5}y = \frac{2}{5}$

7. Solve the following:

(a) $0.8y = 1.6$

*(b) $0.02y + 0.1 = 0.4$

*(c) $0.4n + 0.6n = 12$

*(d) $7.5n + 0.3 = 15.3$

*(e) $3r + 0.001 = 3.001$

*(f) $0.3y = 1.5$

(g) $n + 0.4 = 8.1$

(h) $0.7r = 2.8$

(i) $n - 4.8 = 1.3$

(j) $y + 7.8 = 9.02$

EXERCISES: OBJECTIVE NO. C-15

Solve the following conditions and check your work by substitution. The first one is done for you.

1. EXAMPLE:

	L.H.S.	R.H.S.
$y + 0.15 = 1.5$		
$y + 0.15 - 0.15 = 1.5 - 0.15$	$y + 0.15$	1.5
$y = 1.5 - 0.15$	$1.35 + 0.15$	
$y = 1.35$	1.5	
	$\therefore$ LHS =	RHS

2. $n + 0.25 = 0.5$
3. $0.5k = 10$
4. $0.2n = 0.5$
5. $0.18n = 1.8$

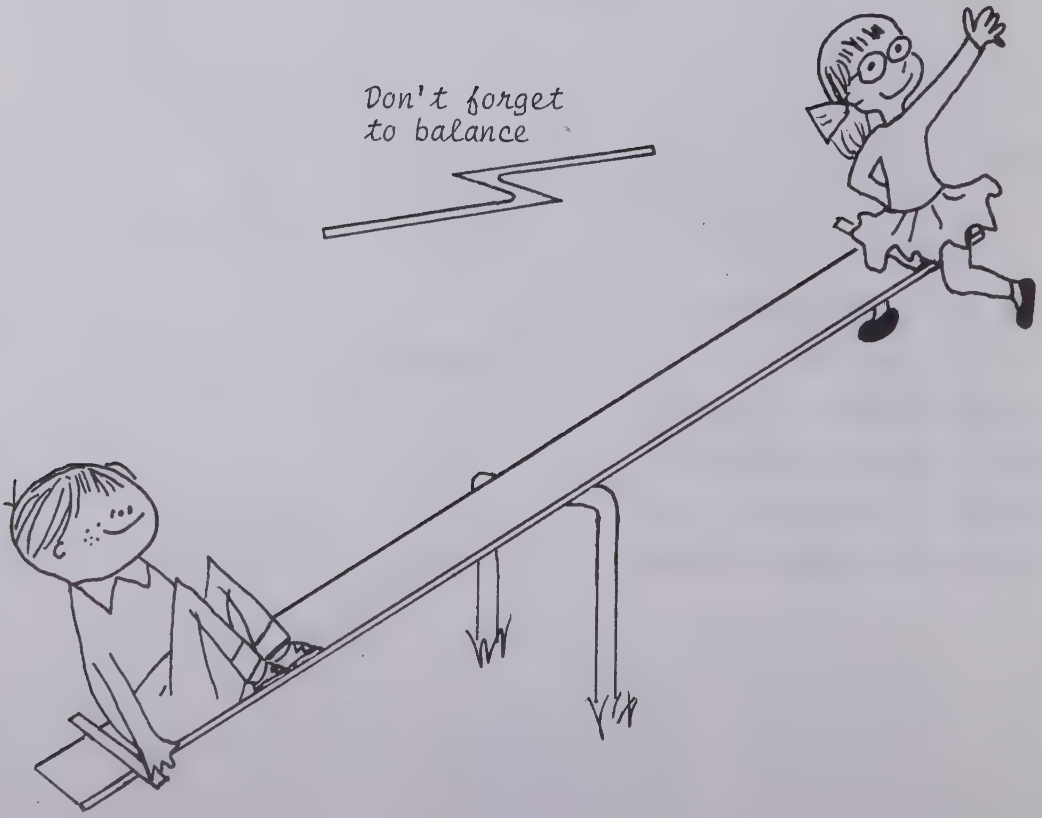
*6. $0.2n + 1.2n = 5.6$

*7. $3y + 0.02 = 0.05$

8. $0.25n = 0.5$
9. $3.6n + 1.2 = 8.4$

*10. $2.7y + 0.4y = 0.62$

11. $\frac{1}{2}y = 2\frac{1}{4}$
12. $y + 1\frac{1}{3} = 3\frac{2}{3}$
13. $3\frac{1}{4}y = 26$
14. $2\frac{1}{2}y + 2\frac{1}{2}y = 10\frac{1}{2}$
15. $2\frac{2}{5}y + \frac{3}{10} = \frac{7}{10}$

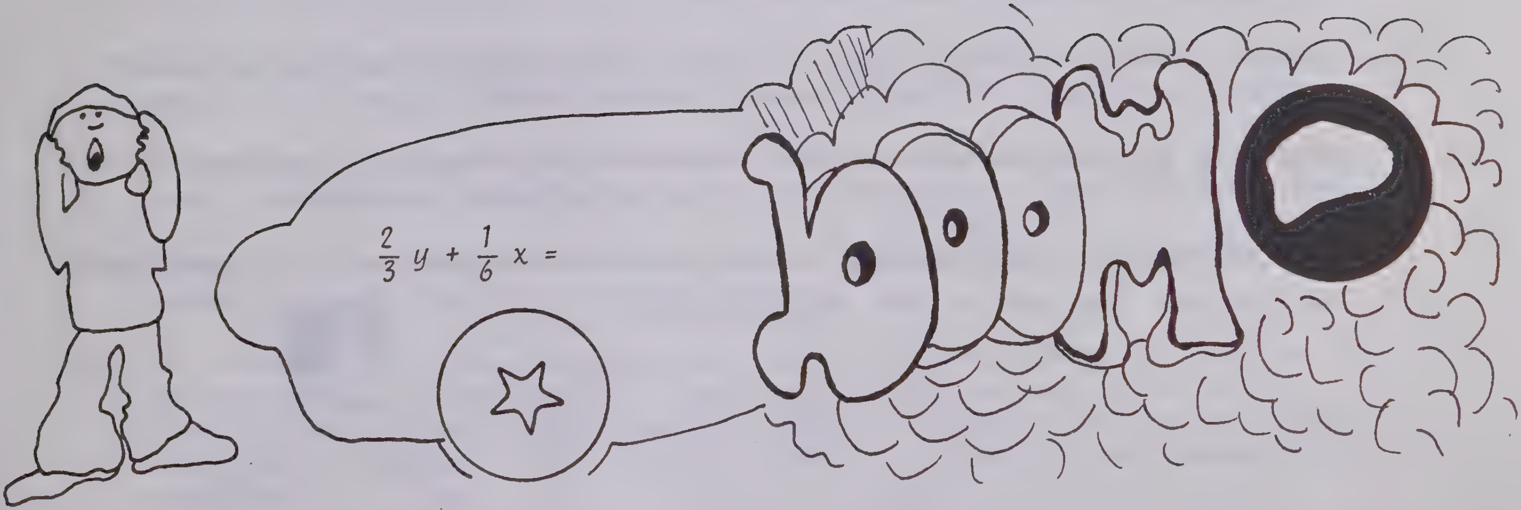


EXERCISES: OBJECTIVE NO. C-16

Write English sentences for the following:

1. $35.89 + 0.25 = n$
2. $0.5 + y = 0.7$
3. $4 \times 0.465 = n$
4. $0.15n = 15.6$
5. $n \div 5 = 0.7$
6. $0.03y + 0.02y = 2.50$
7. $y + \frac{1}{2} = \frac{3}{4}$
8. $y - \frac{1}{3} = \frac{5}{6}$
9. $\frac{2}{3}y = 9$

*10. $\frac{1}{4}y + 2 = 7$



Write mathematical sentences for:

(DO NOT SOLVE)

1. The cost of a shirt is 5 more than 8 dollars.
2. Eight more than a number is 14.
3. Four times a number is 36.
4. Six times a number is 12 more than that number.
5. When a number is multiplied by 3 and its result added to 12, the answer is 35.
6. A boy had some marbles, but gave half of them to his sister. If he now has 23 marbles, how many did he have at first?
7. Dick caught a certain number of frogs. His friend Harry caught 3 times as many as he did. Together they caught 64 frogs. How many frogs did Dick catch?
8. Four girls had stamp collections. If there were 268 stamps altogether, how many did each girl have.
9. If a ball player could hit three times as many home runs next month as this month, he would hit 5 fewer than 35. How many did he hit last month?
10. A super rabbit jumps 4 metres every jump. The total distance he covers is 320 metres. How many jumps does he take?
11. A snail, Pokey, crawled 2.7 cm one morning. His friend crawled 0.3 of that distance. How far did Pokey's friend, creepy, crawl?
12. Susie has a large container of milk available for a recipe. She uses 0.75 ℓ and has 0.33 ℓ left. How much milk did she start with originally?
13. A man's yard was landscaped by putting flowers and shrubs on $\frac{1}{4}$ of it and grass on $\frac{3}{7}$ of it. How much is left for the house?

EXERCISES: OBJECTIVE NO. C-18

1. Joan bought 3.5 kg of apples, 0.75 kg of grapes, and 1.3 kg of bananas. How much fruit did she buy in all?

2. How many wooden floor blocks 8.75 cm in length will fit end-to-end on a floor 2100 cm long?

3. The price of turkeys increased by $0.06 per kg. What would be the price increase for a 5.5 kg turkey?

4. A steel plate is 0.56 cm thick. A bracket to be bolted to the plate is 0.24 cm thick. How much of 1.50 cm bolt will project if one washer 0.125 cm thick and a nut 0.25 cm thick are used? (HINT: draw a diagram)

5. Share $1256.48 equally among 8 people. How much will each receive?

6. What length of steel rod will be used to make 5256 bicycle spokes, each each 24.75 cm long?

7. A telephone wire contracts in the winter by 1.325 cm in every 100 m of its length. Find the amount of contraction in 1760 m of the wire.

8. A turtle, Bert, eats 8 g of hamburger a day. A second turtle, Ernie, eats 9.4 g of hamburger a day. How much hamburger would Bert and Ernie consume in a week?

9. A car travels 5.5 km on a litre of gasoline. How many kilometres will it travel on 18 litres of gasoline?

10. A girl bought 3.75 m of material at $2.95 per m. How much change should she receive from a $20 bill?

11. A machinist cuts 15 pieces each 3.95 cm long from a steel rod that is 120 cm long. What length of the steel rod remains?

12. A refrigerator sells for $395 cash, or $50 down and 12 payments of $33.29 each. How much is saved by paying cash?

13. A piece of meat costs $9.36. The price of the meat was $0.96 per kg. What number of kg did the piece of meat weigh?

14. Six students were practicing using a micrometer. A micrometer is a very accurate measuring instrument. Each student measured the thickness of a block of metal. The readings obtained were as follows: 0.9984 cm, 1.0006 cm, 0.9998 cm, 0.9995 cm, 1.0002 cm, and 1.0002 cm. What was the average of the readings?

15. Ed bought some white popcorn and 0.2 kg of yellow popcorn. He bought 0.75 kg of popcorn in all. How much white popcorn did Ed buy?

16. Mercury is about 13.6 times as heavy as water. A bottle holds 0.65 kg of water. About what mass of mercury would this bottle hold?

17. An engineer was using metal plates that were 0.17 cm thick. How many plates of this thickness did he need to bolt together to give a total thickness of 2.55 cm?

18. If one notebook is 15 mm thick, how many notebooks may be stacked in a desk 90 mm high?

19. A motorist calculated that he got 5.5 km for each litre of gas. How many litres of gas would be needed to go 80 km?

20. A wrapper in a store uses 1.75 m of paper and 3.3 m of string for one package. How much paper and how much string would she use to wrap 16 similar parcels?

21. What was the total rainfall in a week during which it rained 1.5 cm on Monday, 1.3 of a cm on Tuesday, 0.9 of a cm on Wednesday, and was dry the rest of the week?

22. Terry mailed four letters that weighed a total of 185 g. One letter weighed 95 g, another weighed 25 g and a third weighed 30 g. How much did the fourth letter weigh?

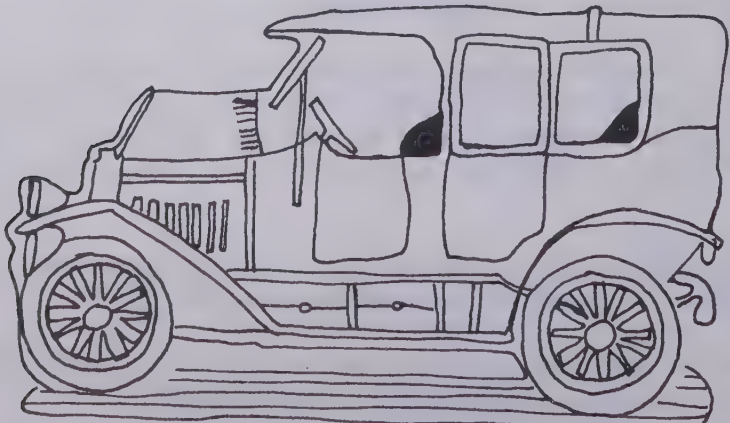
23. From a sheet of tin 1.5 m long, two lengths were cut, on 0.5 m long, the other 0.45 m long. How much of the sheet was left?

24. If you increase "n" by $1\frac{3}{4}$ and then diminish this sum by $\frac{3}{8}$, the result is $3\frac{1}{2}$. Find "n".

25. The movie theatre has 300 balcony seats and 540 orchestra seats. At a certain performance $\frac{2}{3}$ of the balcony and $\frac{5}{6}$ of the orchestra seats were occupied. How many seats were unoccupied?

26. An 80 litre tank is to be filled with gasoline by repeated pourings from a can holding 2.5 litres. How many times must the can be used?

27. A giant-size bottle of liquid detergent has a selling price of 81¢ for 1000 ml. The detergent also comes in a smaller size retailing at 53¢ for 550 ml. Which is the better buy?



WORD SEARCH

Z	N	X	W	C	R	O	T	A	N	I	M	O	N	E	D	L	A
S	M	V	B	N	O	I	T	A	R	E	P	O	B	N	H	I	Q
M	J	L	A	N	O	I	T	A	R	J	L	A	R	E	M	U	N
U	D	A	P	A	U	N	H	T	E	N	I	N	K	C	A	P	S
L	U	M	Q	D	E	W	O	R	E	P	O	R	P	R	T	Z	M
T	A	I	R	M	I	N	M	Y	E	I	G	O	T	B	D	A	T
I	E	C	G	N	R	U	N	E	T	D	I	E	Y	O	R	X	E
P	H	E	O	S	T	O	H	C	Q	N	R	W	I	X	A	L	R
L	S	D	M	R	M	W	A	U	T	U	K	O	V	D	D	P	C
I	E	D	I	M	P	R	L	D	I	V	I	S	I	O	N	R	S
C	V	I	O	T	T	I	F	E	D	L	F	V	T	U	A	E	G
A	E	C	N	B	Q	E	C	R	H	I	G	E	A	S	T	B	R
T	N	I	U	S	N	U	M	E	R	A	T	O	R	L	S	M	A
I	T	S	M	I	S	C	I	R	R	F	F	I	A	O	E	U	R
O	H	A	L	P	E	C	X	D	E	U	E	N	O	X	W	N	Y
N	A	B	F	W	R	H	E	I	T	T	O	V	P	N	O	X	T
P	D	I	G	B	A	O	D	V	J	E	M	A	D	R	L	N	O
Q	R	X	T	Q	R	U	P	A	R	E	N	T	H	E	S	E	S
T	B	L	V	E	G	L	H	E	K	D	H	T	F	I	F	P	B
W	A	N	N	O	I	T	C	A	R	F	O	T	H	I	R	D	A

There are at least 36 words associated with rational numbers. See how many you can find.

REVIEW EXERCISES: OBJECTIVE NO. C-18

1st - Work out the problems below

2nd - Find the answer under the blanks below

3rd - Place the letter of question over the answer

WHAT HAPPENS WHEN YOU FINISH THIS PUZZLE?

A Fred, the pet frog, ate a total of 24.5 mealworms over a two week period. If he averaged 1.5 mealworms a day for the second week how many mealworms did he average per day for the first week?

E $\frac{1}{8} = a$

G $y + 39.67 = 69.81$

H $y - 38.649 = 2.817$

I $10 - 9.999 = n$

M $3.763y = 69.2392$

N $2.375 =$ what fraction

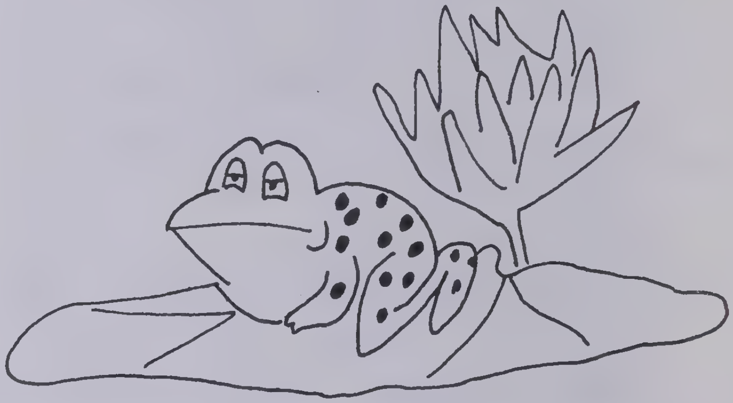
O $9.99 \div 0.003 = n$

T $y \div 21.46 = 2.3$

U $3.64y + 8.31y = 156.545$

Y $41.23 \times 0.34 = n$

X $46.379 \div 1000$



______	______	______	______	______	______
14.0182	3330	13.1	18.4	2	14.0182

______	______	______	______	______	______
30.14	3330	3330	$2\frac{3}{8}$	49.358	3330

______	______	______	______	______	______	______
49.358	41.466	0.125	$2\frac{3}{8}$	0.125	0.046379	49.358

______	______	______	______
13.1	$2\frac{3}{8}$	0.001	49.358

DATE DUE SLIP

EDUC NO 30 '79
DEC 3 RETURN
DUE EDUC OCT 14 '80
OCT 18 RETURN
DUE EDUC DEC 6 '80
DEC 6 RETURN
DUE EDUC NOV 4 '83
RETURN OCT 31 '83
DUE EDUC JAN 24 '84
JAN 24 RETURN
DUE EDUC OCT 03 '84
OCT 01 RETURN
DUE EDUC AUG 13 '85
AUG 13 RETURN
DUE EDUC OCT 01 '85

SEP 30 RETURN
DUE EDUC OCT 09 '85
OCT 04 RETURN
DUE EDUC SEP 01 '86
AUG 26 RETURN
DUE EDUC OCT 06 '86
OCT 9 RETURN
EDUC OCT 25 '92
1992 OCT 13 RETURN
DUE EDUC JAN 20 '93
1993 JAN 08 RETURN

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